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THE ECONOMIC RECORD

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THE JOURNAL OF THE ECONOMIC SOCIETY OF AUSTRALIA AND NEW ZEALAND

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The Economic Record

Vol. XXXVI April, 1960 No. 74

THE AUSTRALIAN ECONOMY, FEBRUARY 1960

Recent major developments in the economy have included a slight improvement in rates of growth, appreciable increases in money wages and salaries, and the virtual abolition of import controls. The financial boom has continued, but there is currently (February) more uncertainty in the stock market than has existed for some time. Immediate prospects suggest perhaps some further slight improvement in rates of growth and some moderate increases in prices.

I. *Wages and Earnings*

Some recent movements in the average weekly earnings of adult males are shown below.

TABLE I

Average Weekly Earnings of Adult Males
(Percentage increase on corresponding quarter of preceding year)

Quarter	1958-59	1959-60
September	3·5	5·7
December	3·7	5·0
March	2·5	
June	3·2	

Source: Commonwealth Bureau of Census & Statistics (hereafter C.B.C.S.), *Digest of Current Economic Statistics.*

The September quarter of 1959 was the first quarter in which the increase of fifteen shillings, granted in the Federal basic wage in June, was paid. This increase no doubt played a part in the acceleration in growth of earnings revealed for the September quarter. A new basic wage case is at present proceeding before the Commonwealth Conciliation and Arbitration Commission. State basic wages tend to follow the Federal wage, and some, of course, follow it exactly. In Brisbane, an adjustment for price increases raised the State basic wage two shillings in February to make it eleven shillings higher than the Federal wage for this city. A similar "automatic" increase of four shillings in Sydney brought the State wage into equality with the Federal.

No figures are yet available which reflect the recent round of increases in margins. These increases, of course, began with the metal trades industry, but it is clear that a very large proportion of wage and salary earners will receive similar adjustments. It is also becoming more apparent that few of these increases will be offset by a reduction in above award payments.

With only sketchy information and a good deal of guesswork, we might suppose the components of average weekly earnings in the September quarter to have been:

	£ per week
Basic wage	13·8
Payments for overtime	0·9
Above award payments	1·5
Margins	5·1
Average weekly earnings	21·3

Margins increases will raise rates for overtime a little and cause some reduction in above award payments. Each of these effects should be small, and since they act in opposite directions, we neglect both. Calculation of the effects of margins increases then revolves around the timing of the increases, the proportion of employees who receive them, and the average size of the increase. If 90 per cent. of employees receive average increases in margins of 22½ per cent., then average weekly earnings will rise by about 4·8 per cent. If these margins are paid for an average of one and a half quarters in 1959-60, they will raise earnings about 1·8 per cent. above what they would otherwise have been in this year. The rest of the rise (3 per cent.) will show as an increase in the average earnings of 1960-61 over 1959-60.

Earnings in the first two quarters were running about 5·3 per cent. above the first half of 1958-59. With this trend continuing and increased margins superimposed, average weekly earnings in 1959-60 could exceed those of 1958-59 by around 7 per cent.

Estimates for 1960-61 become extremely tenuous. On our assumptions, there will be an increase of 3 per cent. due to increases in margins. Each shilling of any average increase in Federal and State basic wages would raise earnings by about one-quarter of one per cent. Some increase in the earnings of females *vis-a-vis* males is possible. Higher demands for labour can increase the amount of overtime work, and, of course, the proportion of work paid at penalty rates. It may also encourage some up-grading of labour. Around 2 per cent. of the increase in earnings in the first half of this financial year over those of a year earlier seems inexplicable in terms of changes in award rates. With demand for labour rising, a lower figure seems unlikely in 1960-61. On this basis, average weekly earnings in 1960-61 will exceed those of 1959-60 by a good 5 per cent. without any increase in basic wages.

II. *Employment*

I have nothing to add to the discussion of the quality of Australian statistics of employment and unemployment. If the demand for labour is measured by the difference between seasonally adjusted series for persons registered for employment and unfilled vacancies, then the low point of the recent recession occurred in October 1958.

Improvement was slow until July 1959, from whence the figure declined rather more rapidly until January of this year. A further decline appears certain for February. Values of this measure at selected times were:

October 1958	46,000
July 1959	38,000
January 1960	23,500

The effects of changes in demand for labour on certain components of labour turnover is worth noting. The following table tells its own story.

TABLE II

Analysis of Separations for Manual Workers
(Percentage of average employment in each group)

	Sept. 1958	Sept. 1959
Males		
Retrenchments	1·4	1·1
On initiative of employees ..	2·4	3·2
Females		
Retrenchments	2·2	0·9
On initiative of employees ..	2·9	3·8

Source: C.B.C.S., *Labour Turnover, September 1959.*

Details of coverage may be found in the source cited. In general, employees in primary industry, shipping and stevedoring and most governmental and semi-governmental authorities are not covered. Retrenchments do not include dismissals for disciplinary reasons, and separations on the initiative of employees do not include those due to death or permanent retirement.

The rise in employment has been fairly widespread, as shown in Table III.

TABLE III

Civilian Employment (thousands)
(Excluding Rural and Household Domestic)

Industrial Group	Dec. 1958	Dec. 1959	Change
Forestry, fishing and trapping	25·5	25·3	—0·2
Mining and quarrying	51·7	50·1	—1·6
Manufacturing	1103·2	1140·5	37·3
Building and construction ..	205·0	207·6	2·6
Transport and communication	349·8	350·4	0·6
Property and finance	111·9	118·5	6·6
Commerce	473·1	483·6	10·5
Health services	111·4	117·3	5·9
Education	101·4	109·7	8·3
Public authority n.e.i.	134·8	136·7	1·9
Other	234·9	238·2	3·3
Total	2902·7	2977·9	75·2

Source: C.B.C.S., *Monthly Bulletin of Employment Statistics.*

There are no satisfactory estimates of changes in hours worked. For what light they throw, the results of the quarterly surveys of the Victorian Chamber of Manufactures are shown below. In April 1958, the surveys covered businesses employing about 100,000 workers. It is impossible to say what influence seasonal factors exert on quarter to quarter movements.

TABLE IV

Average Hours Worked

Quarter	1957	1958	1959
March		41·2	40·5
June	41·0	40·2	40·8
September	40·9	40·4	42·5
December	40·6	40·7	

Source: Victorian Chamber of Manufactures, *Quarterly Industry Surveys.*

III. *Prices*

The following table presents measures of recent changes in some prices.

TABLE V

Price Indexes (percentage changes)

Quarter	Retail Prices (*a*)	Wholesale Prices (*b*)	Import Prices (*c*)	Export Prices
	Percentage change on preceding quarter			
1958-59				
September	+0·3	—1·9	0·0	—2·7
December	+1·0	—0·2	0·0	—3·0
March	+0·4	+0·1	0·0	+0·4
June	+0·8	+1·9	0·0	+12·1
1959-60				
September	+0·6	+0·1	0·0	+4·4
December	+0·7	—0·5	+0·9	+1·0
	Percentage change on same quarter of preceding year			
December 1959 ..	+2·5	+1·6	+0·9	+17·9

(*a*) Interim price index, excluding potatoes and onions.
(*b*) Index of basic materials.
(*c*) Excluding gold.

Sources: C.B.C.S., *Monthly Review of Business Statistics, Wholesale Price (Basic Materials and Foodstuffs) Index, Interim Retail Price Index*; Reserve Bank of Australia, *Statistical Bulletin.*

The rise of 2·5 per cent. in the interim index of retail prices for the twelve months to last December resulted from the following increases in its components:

	Per Cent.
Food	3·1
Clothing and drapery ..	1·7
Rent	5·0
Other items	1·9

Forecasting movements in retail prices over the next twelve months is not an exercise for the cautious. In the first place, one must decide whether one is guessing at movements in indexes, such as the "C" Series or Interim, which are heavily weighted with items of food, clothing and rent, or whether one is interested in a collection of goods which would be rather more heavily weighted with manufactured goods.[1]

In the second place, one must form ideas concerning the present degree of utilization of capacity in industry. It seems that a fair number of industries have the capacity which would enable them to meet some expansion of demand, while employment could rise both as a result of growth in the work force and some reduction in unemployment.

There is now a variety of hypotheses about relationships between changes in productivity and changes in employment and an appropriate choice can yield whatever price change one wishes to forecast. I confess to an impression that there have been many firms whose fall in output (or reduction in growth of output) in the last recession has been much greater than one would expect from movements in the number of their employees. Partly at least, this is due to the fact that some employees constitute part of the overheads of the firm, but one suspects also that other workers have, in some cases, been kept on but worked less intensively than is possible. If this is so, there is additional scope for improvements in productivity.

When one admits the importance of administered prices, the short-run effects of "cost-push" on prices also become vague. On the one hand, the greater utilization of capacity could lower overheads and create some opportunities to absorb increased costs. On the other hand, one is not sure of the extent to which wage increases may be used as an excuse for some fairly large price increases.

Lastly, there are the influences exerted by the rest of the world, both on our exports (many of which are also consumed in significant amounts at home) and on goods subject to competition from imports. These factors seem likely to have a steadying influence on domestic prices in the near future.

Overall, I feel that retail prices might not rise as much in 1960 as a first glance at wage increases might suggest.

Movements in the indexes of prices of wholesale and imported goods were very small and require little comment. A very small decline in the prices of imported basic materials helped to keep the index of wholesale prices nearly stable.

The most significant factor acting on export prices was the improvement in wool, particularly in the June quarter of last year. Butter prices rose very steeply, but this commodity, of course, has

1. It seems likely that the inclusion of more manufactured goods, particularly the larger consumer durables, would lower the estimate of price increases in 1959 given by the Interim index as a whole and perhaps even by the rise of the "other items" component.

a much smaller weight in the index than wool, and its price has fallen early this year.

IV. *Balance of Payments*

Estimates of Australia's balance of payments for the first half of 1959-60 are now available, and in Table VI these are compared with events of the previous year.

TABLE VI

Balance of Payments (£m.)

	1958-59 First half	1958-59 Second half	1959-60 First half	Jan. 1959	Jan. 1960
Current Account					
Exports f.o.b.	381	428	472	68	75
Imports f.o.b.	—397	—396	—453	—74	—76
Trade balance	—16	32	19	—6	—1
Invisibles (net)	—98	—105	—108		
Balance on Current Account	—114	—73	—89		
Capital Items					
Borrowing	89	88	120		
Movement in international reserves	—25	+15	+31		

Sources: Commonwealth of Australia, *Treasury Information Bulletin No. 17*; C.B.C.S., *Australian Oversea Trade.*

Exports of wool and sheepskins accounted for £57m. of the £91m. by which exports in the first half of this financial year exceeded those of 1958-59. A smaller increase in imports than in exports and increased borrowing abroad each help to account for the moderate rise in international reserves.

Industrial production in most of our export markets is rising noticeably, and although American recovery is not keeping up with some of the more optimistic forecasts, quite definite expansion is occurring. On these grounds one might have expected commodity prices to be a little higher than in fact they are. Part of this sluggishness in commodity prices seems to be connected with an expansion in capacity to produce many raw materials.

Guessing at Australia's balance of payments for 1959-60 in February can, of course, make use of a certain amount of hindsight. Compared with 1958-59, exports of wool should be up by about £100m. and wheat and flour by £20m. Other exports may not vary much. The recent almost complete abolition of import controls has come too late to affect this year's imports much. However, even if the second half of the year sees only the same rate of imports as the first, there will be a rise of about £120m. On the same basis, net invisibles would lose us about £20m. more than last year. To have reserves at the same level in June as they were in December, capital inflow would then have to be £238m. This is an item which no one

should pretend to foresee too accurately. The first half of the year saw an inflow of £120m.

V. *Finance*

In Table VII changes in selected items of the assets and liabilities of trading and savings banks in the six months to December 1959 are compared with changes a year earlier.

TABLE VII

Changes in Assets and Liabilities (£m.)

Asset or Liability	All Cheque-Paying Banks		Savings Banks	
	Half year ended		Half year ended	
	Dec. 1958	Dec. 1959	Dec. 1958	Dec. 1959
Deposits	+69	+132	+41	+69
Australian public securities (including Treasury Bills)	+76	+36	+11	+37
Advances	—11	+27		
Loans, advances and bills discounted			+18	+18

Sources: C.B.C.S., *Australian Banking Statistics, Savings Bank Statistics.*

The L.G.S. ratio of the major trading banks has moved thus:

Month	1958-59	1959-60
	%	%
September	19·7	24·0
December	22·9	23·8
March	27·3	
June	22·3	

Statistics recently published in the *Statistical Bulletin* of the Reserve Bank of Australia show the face value of Commonwealth securities held by dealers in the short-term money market to have been £77·1m. in January of this year. These dealers had outstanding £34·6m. in funds from all cheque paying banks, and £40·9m. from other clients.

The Commonwealth Government has budgeted for a cash deficit of £61m. in 1959-60. On 22nd February, the Federal Treasurer announced that loan receipts so far this year had reached £140m. and that he expected the estimated total raisings of £190m. to be achieved.

Preliminary estimates released by the Commonwealth Statistician show the outstanding balances of hire purchase companies to have risen by £42m. in the six months ended December 1959. The recent tendency for a decline in the amount of finance supplied for the purchase of household and personal goods seems now in the process of being reversed. This movement might have been expected from the recent increases in sales of consumer durables.

Hire purchase companies seem increasingly to be moving into fields other than hire purchase financing, and by now the figures for outstanding balances against goods sold at retail must considerably understate the total loans outstanding of these companies. They must also be responsible for a very large proportion of the new money raisings *via* debentures, deposits and notes.

The share price index published by the Reserve Bank of Australia shows the following values for the index of all ordinary shares (base: average for 1952-53 = 100):

June 1954	114
June 1955	128
June 1956	119
June 1957	140
June 1958	151
June 1959	181
December 1959	219
January 1960	234

The index seems to have stayed about stationary from January to February, but the overall rise in share prices and decline in dividend yields has received its share of comment. Explanations have called on the buying of institutional investors, the shortage of scrip, the potentialities of growth and attempts to hedge against inflation. My own estimates of the purchases (net of sales) of some institutions are shown below.

TABLE VIII

Net Purchases of Ordinary and Preference Shares by Selected Groups (£m.)

	1954-55	1955-56	1956-57	1957-58	1958-59
Insurance Offices:					
Life	1	3	6	7	n.a.
Non-Life	2	2	3	4	5
Pension Funds:					
Public	1	2	2	2	3
Private	3	3	4	4	4
Unit Trusts	4	7	4	9	12
Investment Companies	1	1	1	1	1

The value of shares administered by trustee companies has risen fairly steeply, but estimates for this group are not included since many of the portfolios they administer are acquired by transfer of estates to their administration rather than by purchase in any normal sense. Nor are they the beneficial owners of these shares.

Some light on the benefits accruing (to shareholders) with growth and perhaps some measure of the hedge against inflation are shown in Table IX. The rate of return on funds has been calculated on the assumption that a parcel of shares in each company shown was bought at the end of 1954 at the price then ruling. Hold-

ings were assumed to be sold at the end of 1959 at prices then ruling. Returns are calculated on each of the alternative assumptions that all rights and bonus issues were sold at ruling rates and that all rights were taken up and bonus issues held until the end of 1959. Returns are also calculated before tax and after tax of 6/8 in the £1 on dividends.

TABLE IX

Rates of Return on Investment in Selected Ordinary Shares, 1954-59

(Per cent. per annum, compound)

Company	Selling rights, etc.		Taking up rights, etc.	
	Before tax	After tax	Before tax	After tax
Bank of New South Wales	9·0	7·4	11·0	9·3
Industrial Acceptance Holdings	15·0	12·8	16·0	13·8
Broken Hill Proprietary ..	26·3	25·0	30·5	29·3
Colonial Sugar Refining ..	22·8	21·3	24·1	22·6
Myer Emporium	22·6	21·1	22·6	21·1
President Consolidated ..	—50·3	—50·4	—50·3	—50·4

The companies are, of course, well known ones, and the only principle of selection was to think of some leading companies in several fields. President Consolidated is included as a cautionary tale. Neither it nor Myer Emporium made any issues to shareholders in the period covered, though the latter firm has made issues to vendors of property.

The tendency towards higher returns when issues are taken up than when they are sold probably indicates some under-estimation of the potentialities of growth. Given the price of these shares at the end of 1959, it is clear that they were under-valued in 1954. But the argument, of course, does not establish that prices are not over-valued now.

VI. *Production and Demand*

No formal forecast of an inflationary or deflationary gap is attempted here. However, the formalities of the method are easier to abandon than the basic techniques, and some aspects of movements in market supplies and expenditure are discussed.

We began 1959-60 with a fair amount of slack in the economy, but increases in a number of items of expenditure assisted recovery. Expenditure on building reached a very high level. The number of new houses and flats commenced in the first half of 1959-60 was 8·7 per cent. up on the same period of 1958-59. Completions rose 5·6 per cent. in the same period. A long-standing demand and an increased supply of finance seem to have combined to produce these large increases. Construction of buildings other than houses and flats is also running at a high level.

The number of motor vehicles (excluding motor cycles) registered in the first half of 1959-60 was 20 per cent. greater than in the first half of the previous year.

There is less information available on other components of private capital formation, but the impression one gets from the various snippets is that outlay on equipment rose a little. Farm stocks, of course, rise seasonally in the first half of the financial year, but there are no good grounds for thinking that 1959-60 saw exceptional movements. Note also that movements in farm products on the one side and farm stocks and exports on the other tend to cancel each other out. Movements in non-farm stocks are anybody's guess.

It seems unlikely that governmental expenditures either on public works or current goods and services contributed much to the recovery.

Retail sales in the first half of this year have been running at levels about 6 per cent. above those of a year earlier. This indicates a rise of several percentage points in real outlays (see the discussion of price movements in Section III), and makes consumption the star contributor, absolutely if not proportionally, to the recent recovery.

The quantity of exports probably did not change much.

On the supply side, it is impossible to give a picture of movements in all items of production. In 1957-58, the A.N.Z. Bank index of industrial production for all groups excluding fuel and power showed a rise of 8·5 per cent. The corresponding rise in 1958-59 was only 3·9 per cent. The following table gives some details of shorter term and more recent movements.

TABLE X

A.N.Z. Bank Index of Australian Factory Production
All groups excluding fuel and power
(Percentage change on corresponding month of preceding year)

Month	1958-59	1959-60
July	8	7
August	8	8
September	9	9
October	6	12
November	8	
December	2	
January	—2	
February	2	
March	1	
April	0	
May	3	
June	9	

Source: Australia & New Zealand Bank Ltd., *Press Releases.*

The rise from June 1959 is noticeable. It should be realized, of course, that this procedure of comparison with the corresponding period of an earlier year tends to post-date turning points. On the

evidence of this index and of the Commonwealth Statistician's *Monthly Bulletin of Production Statistics,* it would seem that some of the largest proportional changes in output have occurred in television sets, motor vehicles, pig iron, electric motors, paper and worsted and woollen yarn. Outputs of electricity and petroleum products seem to have continued their strong upward trends. The rise in T.V. sets is partly a response to demand in States where it has recently been introduced. (New South Wales and Victoria combined accounted for 60 per cent. of the T.V. sets licensed between June and December, 1959.) Although rising, the output of worsted and woollen yarn is still well below previous peaks.

Wool production in 1959-60 will probably be about 8 per cent. higher than in the year before. Wheat production cannot maintain the high level of 1958-59, and may show a decline of around 12 per cent. Meat production in the first half of 1959-60 was about 3 per cent. lower than in the same period of the previous year. Over-all rural production probably has not risen a great deal in 1959-60.

There are a number of different trends in mineral production. Brown coal production has recently been running at levels about 12 per cent. above those of a year ago. Iron ore also shows a handsome increase. Mine production of lead and zinc has, of course, fallen, but prospects (for price as well as output) are brighter for zinc than for lead. Mine production of copper has held up well. The output of black coal has been falling slightly.[2]

The movements in imports shown in Table VI and of import prices in Table V show that imports provided an important addition to supplies.

In general, the first half of 1959-60 saw an appreciable recovery. Employment rose sufficiently to absorb the whole of the increase in the work-force and make some inroads into the reserve of unemployed workers.

Future movements should be guessed at with caution. The factors encouraging the current expansion of building seem likely to continue, and expenditures on industrial equipment will probably stay at a high level. Vehicle sales will probably remain buoyant, but it seems unlikely that the rates of the December quarter just passed can be maintained, even after allowance for seasonal factors.

We can assume that the net effect on domestic market supplies of movements in farm output, farm stocks and exports is zero. Changes in export income could, of course, affect consumer demand. If one has to take a position here, the omens probably point to some quite mild increases in export prices.

Other changes in consumer demand could be of considerable importance. In the short run one can neglect movements in the ratio of work-force to total population. If real consumption per head actually was a stable function of real income per head, the "gap

2. Based mainly on information contained in National Bureau of Mineral Resources, *The Australian Mineral Industry, Quarterly Review and Statistics.*

analyst'' could then discharge his duties as far as consumption was concerned by a look at the Budget. In fact ''autonomous'' movements in consumption can and do occur, but one can have very little faith in our ability to foresee them.

The conjunction of rising money earnings and a progressive tax structure will have a small but not very significant effect on real disposable income. There is probably a greater margin of excess capacity in the industries producing consumer durables than in a number of other industries (apart from textiles) turning out consumption goods. Hence ability to cope with increases in consumption will be greater if the present tendency for a slight shift towards durables were to continue.

One can assume that there will be attempts to prevent any marked increases in governmental expenditures.

The general picture is one of a fairly large expansion in aggregate demand.

On the supply side we have a smaller back-log of unemployment on which to call than was the case twelve months ago. The growth in the work-force will be quite large but the number of consumers will not remain stable.

The case for expecting a sizeable increase in productivity was outlined in Section 3. This rise and the freeing of imports represent our principal weapons against inflationary developments. One can expect them to make a considerable contribution, but we must feel grateful that the developments described are beginning with our international reserves at their present level.

A. S. HOLMES

University of New South Wales.

FEDERAL-STATE FINANCIAL RELATIONS IN INDIA

In view of current discussions of federal-state financial relations in Australia, it is perhaps worth examining procedures and practices in other federal countries, partly in order to understand the essential nature of our own problems, and partly in the hope that some of the solutions adopted elsewhere may be applicable here.

With these objectives in mind, the present paper attempts a review of federal-state financial relations in India. Being a new federation, India has been able to profit by the experience of others. The Government of India Act of 1935, and the financial arrangements made thereunder, were the products of some of the best British and Indian legal and administrative minds. More recently Independence, Partition and the formulation of the 1950 Constitution have provided both the opportunity and the necessity to re-examine federal-state finances in the light of actual experience. The results are of singular interest to other federal countries, however much they may differ from India in their levels of economic development.

Indian Federalism

Professor Wheare has described the Indian Constitution as being "quasi-federal", principally because the President retains some of the reserve powers formerly vested in the British Viceroys.[1] Indian authorities, however, do not share this view, and point out that the President's powers to take over the government of a State, or to enable the Union Parliament to legislate on State matters, are emergency powers only, akin to "the defence power" elsewhere.[2] It may also be observed that the President is in some sense a servant of the States as well as of the Union, being elected jointly by the members of the Union Parliament and the State Legislatures, the aggregate voting power of the latter being equal to that of the former.[3]

Perhaps a more distinctive feature of the Indian federation is that it was created primarily by a process of devolution from the centre, as the Nigerian federation is being created today, and not by a compact between pre-existing sovereign States, like the original American Union or the Australian Commonwealth.[4] The devolution of powers which created the British-Indian provinces began with Lord Mayo's scheme of decentralization in 1870, and culminated in the Government of India Act of 1935, from which the scheme of federal-state relations embodied in the 1950 Constitution is substan-

1. Wheare, K. C., *Federalism* (Oxford, 1946), p. 28.
2. Bhargava, R. N., *Union Finance in India* (London, 1956), pp. 54-5. See also *Report of States Reorganization Commission* (New Delhi, 1955), par. 150. The President's recent action in Kerala, however, would seem to go somewhat further than this line of argument suggests.
3. Constitution of India, art. 54 and 55. (Referred to below as I.C.)
4. Cf. Bhargava, *op. cit.*, p. 96. This point has also been made by Professor Hicks in *Report of Commission on Revenue Allocation* (Lagos, 1951), p. 26.

tially derived. It is true that after Independence, over 550 princely states were integrated in the Union, but they were in no real position to negotiate the terms on which they acceded. Thus the tradition of a strong centre remains and the States derive their existence and powers not from separate charters, but from the same constitutional document as the federal government itself.

The position of the States in the Indian Union is well illustrated by the comparative ease with which their boundaries were reorganized in 1956 on a linguistic basis, their number reduced from twenty-seven to fourteen, and the "disparate status" of Part A, Part B and Part C States abolished.[5] The Constitution gives the Union Parliament power to legislate on State areas and boundaries provided that the legislation is recommended by the President after he has "ascertained" the views of the Legislatures of the States concerned.[6] In 1956, the Congress Party still controlled every State Legislature, but subsequently it lost control of Kerala, and might in the future lose control of other States. Hence it is problematical whether the political climate will continue in the future to be favourable to such sweeping changes. Nevertheless, the purely legal obstacles to a reorganization of the States are obviously much less in India than in (say) Australia, where the Federal Parliament is empowered to legislate on such matters only "with the consent of the Parliament of a State and the approval of the majority of the electors of the State voting".[7]

A further preliminary point of some importance concerning the financial position of the Indian States is that, unlike the Australian States, they do not have the right to appoint their own Auditor-Generals. There is one Comptroller and Auditor-General for the whole federation, and he is appointed by the President. Under the Constitution, however, he is required to report to the President on Union accounts, and to the respective State Governors on State accounts.[8] He cannot therefore be regarded exclusively as a servant of the Union government, and of course he holds office on a judicial tenure. The Indian States are not therefore in the position of having their accounts reviewed by a central government department, like British local authorities. The system would appear to combine economy in administration with adequate safeguards for the fiscal independence of the States. It has the further advantage of ensuring some measure of uniformity and comparability between the accounts of all governments, since the Comptroller and Auditor-General prescribes a standard classification in the *All-India List of Major and*

5. In the 1950 Constitution as originally drafted, Part A States corresponded to the former British India Provinces, Part B States to those princely States that had survived either on their own or in union with others, and Part C States to the former Chief Commissioners' Provinces. See *Report of States Reorganisation Commission*, p. 6.
6. I.C., art. 3.
7. Commonwealth Constitution, Sec. 123.
8. I.C., art. 151.

Minor Heads of Account. In practice, differences in accounting treatment still exist.[9] Nevertheless, even if only a measure of standardization has been achieved, the administrative and statistical advantages must be considerable. Certainly if such standardization existed in Australia it would greatly simplify the work of the Commonwealth Grants Commission.

Finally, the borrowing powers of the Indian States are subject to certain important limitations which have the effect of giving the central government a monopoly of overseas borrowing, and virtual control over the terms and timing of internal borrowing. The Government of India Act of 1935 had permitted the British Indian Provinces to borrow abroad with the consent of the central government, but the 1950 Constitution restricts the States to "borrowing within the territory of India".[10] However, if a State has any outstanding indebtedness to the Union government, the consent of the latter is necessary before it can exercise its power of borrowing on the internal market. In fact, all States have borrowed from the Union government, particularly in recent years for purposes connected with the first and second Five-Year Plans, and their borrowing programmes are therefore all subject to federal control. It is true that in Australia also in recent years the Commonwealth has been able to limit the volume of State borrowing, but this is because State loan requirements have exceeded the amounts available from public subscriptions. It is also true that the Australian States do not issue their own securities, and that the Commonwealth borrows on their behalf, but this is done through the machinery of the Loan Council, a joint federal-state body to which there is no parallel in India. There is a still greater contrast between the position of the Indian States and that of the American States or the Canadian Provinces, which enjoy independent and virtually unrestricted borrowing powers.

Allocation of Fiscal Powers

In Schedule VII of the Indian Constitution, fiscal powers, along with legislative powers, are exhaustively listed and allocated. The schedule lists 96 federal powers, 66 State powers and 47 concurrent powers. A similar degree of precision has been introduced into the constitutions of Malaya and Pakistan, but earlier federal constitutions were much less specific. Thus the United States Constitution listed the federal powers in only 18 short paragraphs of Section 8, and the Australian Constitution listed them in the 39 paragraphs of Section 51. In both countries, a large field of residual powers remained with the States. In India few residual powers can have escaped the net cast by Schedule VII, but such as may remain are vested in the Union.[11]

9. Some examples are cited by Dr. Bhargava, *op. cit.*, p. 151. See also *Report of the Finance Commission, 1957*, p. 70.
10. I.C., art. 293.
11. I.C., art. 248.

The allocation of fiscal powers in India follows no such simple rule as that which was implicit in the Canadian Constitution, and perhaps also in the Australian, whereby indirect taxation was a federal power and direct taxation a State power. Even the almost universal principle that customs and excise duties are a federal power is subject in India to the important exception that the States are empowered to levy excise duties on alcohol and narcotic drugs. Similarly although the States (or their local authorities) enjoy the right to impose agricultural income taxes, capitation taxes and taxes on trades and professions,[12] the important powers of taxing corporations and non-agricultural incomes rest with the Union. It should be noted that the Union's receipts from non-agricultural income tax must be, and its excise revenue may be, shared with the States, but these provisions are best regarded as methods of financial adjustment and will be discussed as such below. For the moment, we are simply concerned with the constitutional allocation of fiscal powers.

The pattern of allocation is further complicated by two constitutional provisions under which the Union government is empowered to fix the rates of certain taxes, some of which are collected and retained by the States, while the others are collected by the Union but assigned to the States without passing through the Consolidated Revenue Fund of the Union. In the first category are rates of excise duty on medicinal and toilet preparations containing alcohol and narcotics, and rates of stamp duty on most commercial documents.[13] In the second category are transportation taxes, death duties on non-agricultural property, and sales tax on newspapers, newspaper advertisements and inter-state transactions.[14]

Under the latter power an estate duty on non-agricultural property was introduced by the Union in 1953. Eleven of the States then voluntarily authorized the Union to extend this legislation to agricultural property also.[15] The States enjoy exclusive powers with respect to the taxation of agricultural property, but the Constitution empowers two or more States to request the Union Parliament to legislate for them on any State matter.[16] In the States that took advantage of this provision there is, therefore, a unified system of estate duties on both types of property, the rates being fixed and the collections made by the Union, but the proceeds being assigned to the States.

More serious complications arise in connection with the levy of sales taxes which, having been a provincial power under the Government of India Act, 1935, was continued as a State power under the

12. Under article 276 the latter taxes are subject to a maximum annual rate of Rs. 250 per person.
13. I.C., art. 268.
14. I.C., art. 269.
15. Bhargava, *op. cit.*, p. 201.
16. I.C., art. 252. By way of contrast the Canadian Supreme Court has ruled that neither the Federal Parliament nor a provincial legislature can delegate its powers to the other. See *Evolving Canadian Federalism* (Duke U.P., 1958), p. 117.

1950 Constitution. During and after the war, however, the Provinces had raised the rates of sales tax to such an extent as to create much friction and litigation.[17] The Constitution, therefore, while leaving the power to levy sales or purchase taxes with the States, prohibited any State from imposing such a tax on transactions which occurred (a) outside its boundaries, (b) in the course of international trade, (c) in the course of inter-State trade, or (d) in respect of goods declared to be essential for the life of the community by the Union Parliament.[18] Moreover, as a result of an outcry against a Madras tax on newspapers and a Bombay tax on newspaper advertisements,[19] these types of sales tax were included among the taxes which Article 269 empowers the Union to fix and collect on behalf of the States, but the Union has in fact refrained from levying such sales taxes. Subsequently, sales taxes on inter-State transactions were brought within the same category by a constitutional amendment. A federal inter-State sales tax was then introduced in 1957, and in the same year the Union and the States agreed to replace the State sales taxes on three important items, viz., factory-made textiles, sugar and tobacco, by additional Union excise duties on those commodities, the net proceeds of which were to be allocated among the States.

These complicated provisions are aimed partly at securing uniformity of tax rates, partly at effecting economy in collection and partly at preventing double taxation among the States. As for double taxation between the Union and the States, that is virtually precluded by the absence of any important field of concurrent tax powers.[20] In fact, the only concurrent tax powers listed in Schedule VII relate to stamp duties and motor taxes. As explained above, the rates of commercial stamp duties are fixed by the Union, but the duties are collected and retained by the States; only legislation about matters other than the rates of duty is a concurrent power. Again, the taxation of motor vehicles is a State power, but "the principles on which taxes on such vehicles are to be levied" is a concurrent power. With these two minor exceptions, there are no concurrent tax powers in India. Double taxation is still possible in the form of a Union excise duty and a State sales tax on the same commodity, but there are no rival jurisdictions levying the same tax on the same commodity or person, as in the United States or Canada. Moreover, this separation of tax fields is determined by the Constitution itself and not by the uncertain process of judicial interpretation, on which Australia has had to rely to exclude the States from the income tax and sales tax fields.

In a federation, inter-governmental disputes may arise not only from rival claims to jurisdiction within particular tax fields, but also

17. Bhargava, *op. cit.*, p. 225.
18. I.C., art. 286; the Union Parliament passed an Essential Goods Act in 1952.
19. Bhargava, *op. cit.*, p. 80; and *Report of Taxation Enquiry Commission* (New Delhi, 1955), Vol. III, p. 36.
20. Bhargava, *op. cit.*, pp. 81, 131 and 221.

from the claim of each government to immunity from taxation by the other. The Indian Constitution confers three such immunities. In the first place, it exempts both the income and the property of the States from taxation by the Union, but it gives the Union Parliament power to over-ride the exemption in respect of State business undertakings.[21] Presumably, therefore, the Indian States or the instrumentalities could be made liable, like their Australian counterparts, to a federal pay-roll tax, were one to be imposed. Secondly, the Constitution exempts the property of the Union from taxation by the States or their local authorities, but here again there is a saving clause under which the Union Parliament may legislate to waive the exemption.[22] In view of Canadian and American experience, where the exemption of federal property from local rates is a very live issue, the saving clause would seem to be a wise one. Thirdly, the Constitution exempts the Union from State taxation on the consumption or sale of electricity.[23] The exemption applies also to government railways, and to companies engaged in their construction or operation, but again may be waived by Act of the Union Parliament. In India electricity taxes are levied by most States, but are not a significant part of State revenue except in Bombay and Bengal.[24] It may also be observed that the States are precluded, except with the consent of the President, from imposing taxes on electricity or water supplied by inter-State river authorities established by the Union.[25]

Revenue and Expenditure

The practical effect of the above division of fiscal powers can be illustrated by examining the main sources from which Union and State tax revenue was actually derived in some recent year. For this purpose 1955-56 has been selected, since it is the year for which the second Finance Commission's data are available.

In 1955-56 the tax revenue of the Union government was Rs. 480 crores.[26] Of this sum, customs duties and income taxes accounted for over one-third each, and excise duties for slightly less than one-third. Customs duties are, traditionally, the main source of federal revenue, but during and immediately after the last war income tax took first place. In underdeveloped countries such as India, however, income tax is a somewhat inelastic source of revenue largely because of its narrow base. Dr. Bhargava has pointed out that only one person in seven hundred pays income tax in India, as

21. I.C., art. 289.
22. I.C., art. 285.
23. I.C., art. 287.
24. *Report of Taxation Enquiry Commission* (New Delhi, 1955), Vol. III, p. 119.
25. IC, art. 288.
26. Rs. 1 crore = Rs. 10 million = approximately £A1 million at the current Indian-Australian exchange rate. It would therefore seem most useful as well as least troublesome to follow the Indian practice of expressing financial data in crores of rupees.

compared with one in every three or four in the United Kingdom or the United States.[27] In Australia the proportion is about one in two-and-a-half. In India, therefore, increasing resort has been had to excise duties, particularly since the integration of the Princely States, the existence of which had formerly made difficult any extensive use of excise duties.

In 1955-56 the total tax revenue of the States (excluding local authorities) was only Rs. 281 crores, *i.e.* nearly Rs. 200 crores less than that of the Union. Over Rs. 80 crores was derived from sales taxes and about the same amount from land revenue. Traditionally, land revenue has been the chief source of State income, but being unpopular partly because of its association with the British *raj*, it has tended to decline relatively, despite the abolition of the *zamindar* (or tax farming) system in some States. Little effort has been made to supplement land revenue by agricultural income tax, which is not levied at all in five of the States. Moreover, much of the revenue that might have been derived from the potentially lucrative liquor excise has been sacrificed by the introduction of complete prohibition in Bombay and Madras, and partial prohibition in seven other States, with the result that this excise yielded only Rs. 44 crores in 1955-56, or little more than half the revenue derived from either sales tax or land revenue. Thus the States have had to seek new sources of revenue, and they have turned increasingly towards commodity taxation in the form of sales taxes,[28] just as the Union itself has turned increasingly towards commodity taxation in the form of excise duties.

The adequacy of the fiscal resources of the Union and State governments has to be judged by reference to their respective needs. Actual expenditure is not, of course, a satisfactory measure of needs, any more than actual revenue is a satisfactory measure of fiscal resources, but it will suffice for the present purpose. In 1955-56 when the tax revenue of the Union exceeded that of the States by Rs. 200 crores, its expenditure on services fell short of that of the States by an even larger amount. The chief item of Union expenditure was defence, which accounted for nearly half its total outlay. The States' expenditure on social services, including education, was, however, nearly equal to that of the Union on defence, and in addition the States had other heavy responsibilities in respect of services such as police and civil works. The higher expenditure of the States was to some extent offset by higher revenue from non-tax sources such as the earnings of Government business undertakings, which seem to be generally profitable in India.[29] Nevertheless, the net expenditure chargeable against tax revenue was Rs. 171 crores less for the Union

27. Bhargava, *op. cit.*, p. 195.
28. *Ibid.*, p. 222.
29. This applies even to railways, but, by contrast with Australia, the Indian railways are a federal and not a State responsibility. The 1957 Finance Commission, however, drew attention to a deterioration in the financial results of State irrigation and electricity undertakings. *Report*, pp. 30-31.

than for the States. This left the Union with an excess revenue of Rs. 189 crores and the States with a short-fall of Rs. 181 crores.

The relevant figures are set out below:

1955-56	Union Rs. crores	States Rs. crores
Expenditure on Services	370	597
Non-tax Revenue	79	135
Expenditure chargeable against Tax Revenue	291	462
Tax Receipts	480	281
Excess (+) or Deficiency (—)	+189	−181
Financial Transfers	−148	+148
Surplus (+) or Deficit (—)	+41	−33

Source: *Report of Finance Commission, 1957*, Tables 3, 5(e) and 8(e).

Although the Indian Constitution thus gives to the Union tax resources considerably in excess of its needs, and to the States tax resources that fall far short of their needs, it does not leave this maladjustment unrecognized and unrectified. It provides specifically for its correction by the sharing with the States of the proceeds of certain Union taxes, and by the payment of grants to the States from the Union's general revenue. We shall review these provisions before examining their actual working, but it may be noted here that in 1955-56 Rs. 148 crores were transferred from the Union to the States, about half of the transfers being in the form of tax shares and the other half in that of federal grants. In the aggregate the States were still left in deficit in 1955-56, but normally transfers from the Union are regarded as sufficient to cover their deficits on revenue account, excluding expenditure under the Five-Year Plan.[30]

This pattern of fiscal relationships is the outcome of a long process of constitutional development. The devolution of financial authority from the Centre to the British-Indian Provinces in the latter part of the nineteenth century led to a system of provincial Financial Settlements, a feature of which was certain "divided heads" of revenue. However, the actual taxes thus subject to division and the proportions in which they were divided varied in a somewhat arbitrary manner from Province to Province. In the 1920's an attempt was made to give the Provinces greater autonomy by replacing this system with one under which there was a complete separation of fiscal powers. Under the Government of India Act, 1919, excise duties, stamp duties and irrigation receipts became exclusively provincial sources of revenue, and it was intended that income tax should be exclusively central. At the outset, this resulted in the Provinces having a surplus of revenue over needs, and for a time they were required to make contributions to the Centre. However, these provincial contributions had to be abolished because pro-

30. *Ibid.*, pp. 26-27.

vincial sources of revenue proved relatively inelastic and failed to keep pace with their expanding needs. In the meantime, a small proportion of central income-tax receipts had been made available to the Provinces, under what was known as Devolution Rule 15, and the possibility of giving the Provinces a more substantial share of income-tax receipts was widely canvassed by various committees prior to the enactment of the Government of India Act, 1935, which laid the foundation of the present system. The Union was thus given a surplus of tax revenues over its needs and required to make transfers to the States after it had proved impracticable either to effect a complete separation of tax resources, or to operate a system under which the Provinces enjoyed surplus revenues and made contributions to the Centre.

Machinery for Financial Adjustment

Inter-governmental transfers are common enough in most federations, but generally they are extra-constitutional in the sense that the Constitution does not itself envisage or provide for large permanent transfers. This is true of the American Constitution, with the result that federal grants-in-aid have to be given to the States under the power of Congress to make appropriations for the "general welfare". In Canada, the British North America Act did provide for certain "statutory subsidies" to the maritime Provinces, but it specified explicitly the rates of subsidy, and secular inflation has now reduced them to a relatively unimportant place in the general scheme of financial assistance to the Provinces. The Australian Constitution provided for the payment of three-quarters of customs and excise revenue to the States, but in order to overcome the opposition of free traders these payments were limited to the first ten years of federation, after which time their continuation was to become a matter for the Commonwealth Parliament.[31] A similar limitation was imposed on the power to grant financial assistance to any State "on such terms and conditions as the Parliament thinks fit".[32] In the event, the Commonwealth has continued to make grants to the States, but the sharing of customs and excise revenue ceased in 1910 and it seems to have been anticipated that there would be no permanent need for the redistribution of Commonwealth revenue in favour of the States.[33]

The limited provisions thus made for financial transfers in other federal Constitutions contrast sharply with the detailed arrangements set out in the Indian Constitution for tax sharing and federal grants. The most important of the shared taxes is the Union income tax on non-agricultural incomes. The Constitution contains a mandatory article which requires the Union, before paying the net proceeds of the tax into Consolidated Revenue, to assign a percentage thereof to

31. Commonwealth Constitution, Sec. 87.
32. *Ibid.*, Sec. 96.
33. Commonwealth Grants Commission, 3rd Report (1936), pp. 20-22.

the States.[34] Proceeds attributable to federal territories or federal emoluments are excluded from this requirement, and so, too, is corporation tax.[35] Secondly, the Constitution contains a permissive power under which the Union may, if Parliament so decides, transfer to the States all or part of the proceeds of any Union excise duty.[36] These provisions differ in principle as well as in importance from those already discussed under which, as a matter of administrative convenience, the rates of certain less important taxes are fixed by the Union, although they are collected by the States or assigned to them in their entirety. The fact that the actual proportion of income tax and excise duties to be paid to the States is left to be determined according to the degree of adjustment found necessary clearly indicates that the purpose here is financial adjustment, not administrative convenience.

In respect of the above provisions the Constitution follows closely the pattern set by the Government of India Act, 1935. That Act also made provision for the sharing of a third tax, namely, the export duty on jute. However, only the jute growing provinces were eligible for a share of this tax, and after Partition 70 per cent of the jute-growing area was lost to Pakistan. Under the Constitution the sharing of this tax was therefore terminated, but the four States of Assam, Bihar, Orissa and West Bengal were to be compensated by special grants-in-aid for the first ten years.[37] These grants cease in 1960, and this provision can therefore be regarded as transitional in character.

Apart from the grants in lieu of the jute export duty, the Constitution provides for two other types of grant of a more permanent and general character. The first are grants-in-aid, which correspond to the Australian special grants, and *may* be given to "such States as Parliament may determine to be in need of assistance, and different sums may be fixed for different States".[38] In particular, grants-in-aid *must* be made to Assam for the administration and development of the tribal areas in that State, and to other States for approved development schemes in respect of their scheduled tribes or areas.[39] Secondly, the Constitution gives to the Union a very wide power, reminiscent of the United States appropriation power, to make "any grants for any public purpose, notwithstanding that the purpose is not one with respect to which the Parliament may make laws".[40] A similar power is conferred on the States but in their case it seems to be nominal. In the case of the Union, however, the power has been used to make a wide range of conditional grants for specific purposes, on the American pattern.

34. I.C., art. 270.
35. In India companies are liable to corporation tax in addition to the ordinary income tax. See *Report of Finance Commission, 1953,* p. 67.
36. I.C., art. 272.
37. I.C., art. 273.
38. I.C., art. 275.
39. *Ibid.*, first and second provisos.
40. I.C., art. 282.

The Finance Commission

Although the Indian Constitution provides explicitly for this elaborate system of tax sharing and federal grants, it does not lay down the precise sums that shall be transferred to the States under any of these provisions.[41] In this it again follows the precedent set by the Government of India Act, 1935. When that Act came into effect, the determination of actual tax shares and grants-in-aid was referred for expert examination to Sir Otto Niemeyer, whose reputation seems to stand higher in India than in Australia. With some necessary modifications after Partition, Sir Otto Niemeyer's award continued to operate until the 1950 Constitution came into effect. In the meantime, an Expert Committee on the Financial Provisions of the Union Constitution (1947) had proposed that a Finance Commission should be set up to make periodical reviews of Federal-State financial relations. This recommendation was incorporated in the Constitution, and the President is required to appoint every fifth year, or earlier if necessary, a Finance Commission of five members.[42] Parliament determines their qualifications and conditions of service, but the Constitution prescribes their terms of reference. The Commission has the duty of making recommendations to the President concerning the shares of Union taxes to be paid to the States, the allocation of those shares among the States, the principles on which grants-in-aid shall be made to the States and any other matter which the President may refer to them "in the interest of sound finance". The President is required to lay the recommendations of the Commission before Parliament,[43] but is empowered to give effect by Order to recommendations concerning income tax and grants in lieu of the jute export duty.[44] Pending provision of the necessary funds by Parliament, the President may also give effect by Order to recommendations concerning other grants-in-aid, but recommendations concerning the sharing of excise duties require parliamentary legislation.[45] It is important to observe, however, that conditional grants given by the Union under the "public purpose" power are not determined by the Commission.

It proved impossible to appoint a Finance Commission immediately the Constitution came into effect, and C. D. Deshmukh was therefore appointed to make an interim award, to replace the Niemeyer award for the first two years of the new era. The first Finance Commission was appointed in November, 1951, with the task of reporting on the allocation of income tax, excise duties, grants-in-aid and grants in lieu of the jute export duty. Its Final Report, which was published on December 31st, 1952, gives a useful historical account

41. Except that the grants-in-aid to Assam for the administration (as distinct from the development) of its tribal areas shall be equal to the net expenditure incurred for that purpose in the two years preceding the commencement of the Constitution.
42. I.C., art. 280.
43. I.C., art. 281.
44. I.C., art. 270, (4(b)), and art. 273 (3).
45. I.C., art. 275 (2), and art. 272.

of the evolution of federal-state finances in India, and draws a number of illuminating comparisons with other federations in order to establish the principles on which grants-in-aid should be based.[46] Its recommendations for the quinquennium ending March 31st, 1957, were adopted in full.

The second Finance Commission was appointed in June, 1956. In addition to the matters on which the first Commission had reported, it was given the task of reporting on possible modifications in debt charges on loans made by the Union to the States between 1947 and 1956, and on the allocation among the States of the estate duty on non-agricultural property, a tax on railway passenger fares and the additional Union excise duties in lieu of State sales taxes, all of which were introduced after the report of the previous Commission.[47] It was also necessary to take account of changes arising from the re-organization of the States in 1956 and the progress of the second Five-Year Plan. The Commission's Final Report, containing its recommendations for the quinquennium ending March 31st, 1962, was published on September 30th, 1957.[48]

It has thus become established practice in India to leave the specific amounts and the allocations of tax shares and grants-in-aid to be determined on a non-political basis. However, whereas this determination was made by a single arbitrator under the 1935 Act, it must, under the 1950 Constitution, be made at regular intervals by a Commission of five members. This innovation may owe something to the example of the Commonwealth Grants Commission, which was reported upon to the Indian Government by Mr. B. K. Nehru and Professor Adarkar in 1947. There are, however, some obvious differences.

In the first place, the Finance Commission derives its status directly from the Constitution and therefore could not be abolished or discarded without a constitutional amendment, whereas the Commonwealth Grants Commission is a purely statutory body which could be abolished simply by repealing the Act. In fact, this difference may be mainly formal, since if the Union Government wished to render the Finance Commission ineffective it could probably do so in other ways. For example, it can no doubt influence the President's choice of personnel, and in any case neither the President nor Parliament is bound to accept the Commission's recommendations, although they have hitherto done so, as the Commonwealth Parliament has accepted the Commonwealth Grants Commission's recommendations.[49]

46. Government of India Press, New Delhi, 1953. (Referred to henceforth as 1st F.C.)

47. See above, p. 194 for estate duty, and p. 195 for additional excise duties.

48. Government of India Press, New Delhi, 1957. FD. 84/57. (Referred to henceforth as 2nd F.C.)

49. It is with these possibilities in mind that Dr. Bhargava has suggested that the Chairman of the Commission should be a Supreme Court judge, that the other members should be appointed for life, and that the Commission's recommendations should be binding on the Union Government. *Op. cit.*, p. 84.

Secondly, the functions of the Finance Commission cover a much wider field than those of the Commonwealth Grants Commission, which are limited to "special grants". In India only "public purpose" grants for specific objectives lie outside the purview of the Finance Commission, but in Australia, in addition to this type of grant being determined by the Commonwealth Government, the main category of general financial assistance to the States (*i.e.*, tax reimbursement including supplementary grants) has hitherto been determined by political bargaining at annual Premiers' Conferences.

Thirdly, the Finance Commission is required to make its general review of federal-State finances normally only every fifth year, whereas the Commonwealth Grants Commission, in its much more limited field, makes an annual review. Some of the early Provincial Settlements in British India were also subject to quinquennial review, but the adoption of this principle in the Constitution probably owes something to the example of the post-war Canadian Tax Rental Agreements, each of which ran for five years, with the important difference that they were negotiated on the political level at conferences with the Provincial Premiers. The principle of regular review of the whole field of federal-State finance at reasonably lengthy intervals obviously has much to recommend it, as compared either with the absence under the 1935 Act of any provision for regular review, or with the virtually annual reviews that have hitherto occurred at Australian Premiers' Conferences.

Finally the Indian Finance Commission, in contrast with the Commonwealth Grants Commission, suffers from a serious lack of continuity. The Commonwealth Grants Commission is in continuous existence, its three members serving three-year terms on a part-time basis. On the other hand, the five members of the Indian Finance Commission serve full-time for about one year and then disperse. The member-secretary of the first Commission became an ordinary member of the second Commission, but otherwise they had no common membership. The first Commission recommended that a small research unit should be attached to the President's Secretariat in order to continue its work and prepare material for future Commissions, but according to the second Commission this experiment was not successful.[50] They in turn therefore recommended that a nucleus staff should be retained in the Finance Ministry, and that the necessary statistical and other work should be undertaken by that department.[51] The second Commission also complained that the temporary nature of their work made it difficult to recruit staff.[52] This discontinuity in the Commission's work is of course the consequence of the system of quinquennial review and has to be set against the advantages of that system.

50. 1st F.C., p. 110.
51. 2nd F.C., p. 71.
52. *Ibid.*, p. 4.

Tax Sharing

An important distinction needs to be drawn between tax sharing on the basis of national tax collections and tax sharing on the basis of State or Provincial tax collections. Under the first system, which is the one which operates in India, the States as a whole are assigned in one aggregate sum a proportion of the tax proceeds collected from the nation as a whole. Under the second system, which is the one which now operates in Canada, each State receives a proportion of the tax proceeds collected by the central government from that State's own residents or from within its own territories. Under this system, the allocation of tax shares among the States or Provinces is automatically determined, but under the first or Indian system this is not so, and the allocation of tax shares among the States has to be considered as a separate problem. The present section will, therefore, be confined to examining the determination of the aggregate amount assigned to the States, and the question of its allocation among the States will be deferred until the next section.

As already indicated, tax sharing applies to both income tax and excise duties in India. The share of income tax payable to the States under the 1935 Act was fixed on Sir Otto Niemeyer's recommendation at 50 per cent. of the net proceeds. In 1952, on the recommendation of the first Finance Commission, this proportion was raised to 55 per cent., with an estimated yield of about Rs. 56 crores per annum. In 1957, on the recommendation of the second Finance Commission, the proportion was again raised to 60 per cent., with an estimated yield of about Rs. 67 crores per annum. The proportion of income tax receipts thus made available to the States is much higher than in other federal countries which operate a tax-sharing system. In Central Africa, the proportion of personal income tax payable to the units is 40 per cent., and in Canada it is only 13 per cent., but in that country tax sharing extends also to corporation tax and estate duty.

The provisions of the 1935 Act relating to the sharing of indirect taxes were never in fact operative, except for the export duty on jute, with respect to which the Act provided that not less than 50 per cent. of the net proceeds should be shared with the jute-growing Provinces. Actually the proportion was fixed on Sir Otto Niemeyer's recommendation at 62½ per cent., but this was reduced to 20 per cent. after Partition, and abolished altogether under the 1950 Constitution. On the other hand the sharing of excise duties, provision for which was retained in the Constitution, has now become a means of providing the States with additional revenue over and above their increased share of income tax. On the ground that the latter could not provide the whole of the necessary increase in State revenue, the first Finance Commission recommended that the States should receive 40 per cent. of the net proceeds from the excise duties on tobacco, matches and vegetable products. These three duties, of which that on tobacco is

much the most important, were selected for division with the States because they appeared to be levied on commodities of common and widespread consumption, and ones which yielded a fairly substantial and stable revenue.[53] In 1957, the second Finance Commission went somewhat further and expressed the view that income tax had ceased to be an expanding source of revenue and that any further devolution of revenue to the States by tax sharing would have to come from excise duties.[54] They therefore recommended that the number of divisible duties should be increased to eight, but that the States' share of the proceeds of each duty should be only 25 per cent. In addition to tobacco, matches and vegetable products, the divisible duties now include those on sugar, coffee, tea, paper and vegetable oils.

It was estimated that the effect of these recommendations would be to double the amount of excise revenue payable to the States raising it from Rs. 16 crores to about Rs. 33 crores per annum. This compares with the estimated increase from Rs. 56 crores to Rs. 67 crores per annum in the amount of income tax revenue payable to the States. Thus whereas under the first Finance Commission's tax-sharing scheme excise revenue accounted for only about one-third of income tax revenue, it was expected to become about one-half under the second Finance Commission's scheme.[55] In fact this expectation has not been entirely fulfilled, since the amount of income tax revenue payable to the States has increased more than was expected, and in the current Budget (1959-60) it is estimated at Rs. 78·6 crores.

Although the second Finance Commission's recommendations resulted in doubling the amount of excise revenue payable to the States, this increase was not proportional to the even greater rise that had occurred in recent years in the Union's total excise revenue. Before the war, the central government levied only five excise duties, but the number had risen by 1952-53 to 13, with an annual yield of Rs. 83 crores, and by 1957-59 to 29, with an annual yield of about Rs. 260 crores. Thus whereas the first Finance Commission's award of Rs. 16 crores gave the States about one-fifth of total excise revenue in 1952-53, the second Finance Commission's doubled award of Rs. 33 crores gave the States only about one-eighth of the Union's total excise revenue in 1957-58.

The continued payment to the States of even this proportion of Union excise revenue is, however, somewhat unique. The sharing of indirect taxes in other federations has been either temporary or confined to duties on single commodities subject to special conditions. Thus the arrangement whereby the Australian States were paid three-quarters of customs and excise revenue lasted only for the first ten years of federation. In Australia, again, part of the revenue from customs and excise duties on petroleum products was paid to the States as road grants between 1931 and 1959. In Malaya, also, 10 per

53. 1st F.C., p. 82.
54. 2nd F.C., pp. 39 and 42.
55. 2nd F.C., p. 71.

cent. of the revenue from the tin export duty is payable to the States under the new Malayan Constitution. Apart from examples of this type, however, tax sharing as a continuing arrangement is in other federations confined to direct taxes, if it exists at all.

In India the sharing of both income tax and excise duties takes the form, in the first instance at least, of assigning to the States a fixed and predetermined proportion of tax proceeds. This might seem to restrict the federal government's freedom of action in the fiscal sphere, precluding it from raising (or lowering) tax rates for its own purposes without also automatically increasing (or decreasing) the amounts payable to the States, whether or not that happened to be necessary or desirable. It was probably for this reason that the Malaya Constitutional Commission in 1957 thought it was "undesirable in principle to allocate to the States the proceeds of any particular tax or duty".[56] However that may be, tax sharing on a fixed proportionate basis not only exists in India, but its restrictive character seems to be enhanced by a constitutional provision which makes a Presidential recommendation a prior condition for the introduction of federal legislation seeking to vary the rate of any tax in which the States are interested, or the principles on which any taxes are shared with the States, or the definition for tax purposes of "agriculture income" (which of course affects the respective spheres of State and Union income tax).[57]

In fact, however, the Indian system is not so restrictive as it seems at first sight, at least not so far as income tax is concerned. Under the Niemeyer award the Centre was permitted to retain a certain minimum amount of income tax proceeds for the first five years. During the war the Centre again retained part of the Provinces' share of income tax, and it was not until 1950-51 that they finally received their full share. Moreover, the Constitution permits the Union, subject to the necessary legislation being introduced on the recommendation of the President, to impose an income tax surcharge for its own exclusive use.[58] This power has in fact been used to supplement ordinary tax collections by about 4 per cent., or some Rs. 6 crores per annum, none of which is shared with the States. In this way the Union has power to vary the effective total tax rate, whilst leaving the ordinary tax rate and the State share of ordinary tax proceeds unchanged. The effect is similar to that of giving the States the proceeds of a predetermined rate of tax, in the way that the above-mentioned road grants to the Australian States were equal to the proceeds of specified rates of duty on petroleum.[59] An example

56. *Report* (H.M.S.O., London, 1957), p. 60.
57. I.C., art. 274.
58. I.C., art. 271. The requirement of a Presidential recommendation is imposed by art. 274. Surcharges could also be imposed on those taxes which the Union levies and collects on behalf of the States, such as estate duties.
59. Thus from 1956 to 1959 the road grants were equal to a duty of 8d. per gallon on both imported and locally refined petroleum, the total duty on the former being 13d. per gallon, and that on the latter being 11¼d. per gallon.

of a direct tax being similarly shared on a fixed tax rate basis is the Canadian corporation tax. The federal rate of tax is 45 cents per dollar of profits, but the provincial share is equal to the proceeds of a 9 cents per dollar tax on profits. This type of tax sharing permits a federal government to change its tax rates without necessarily changing its payments to the States, and substantially the same result is achieved by the Indian system of surcharges.

Even with these modifications, tax sharing differs markedly from a system of federal grants, provided out of general revenue and determined independently of tax yields, as, for example, the Australian Tax Reimbursement Grants. Under any tax-sharing system the payments to the States fluctuate as economic conditions affect the tax yields. This means that during a period of deflation and falling tax yields the federal government is not in the position of having to meet guaranteed minimum payments to the States; and equally that in a period of inflation and rising tax yields the payments to the States do not lag behind the rise in federal revenue. The latter situation has of course been the relevant one since the end of the war, and the fiscal position of the Indian States during the inflationary years 1957-58 and 1958-59 seems to have been eased considerably by this element of built-in flexibility in their revenues. By contrast the grants payable to the Australian States under the Tax Reimbursement formula lagged persistently behind their needs, and every year after 1944 the Commonwealth had to provide them with supplementary financial assistance.

Allocation Among the States

Tax sharing on the basis of national tax collections, as in India, results in an aggregate sum becoming available for allocation among the States. In India this sum was expected by the second Finance Commission to be Rs. 100 crores per annum, but because of the effect of inflation on income tax yields it is in fact in excess of Rs. 110 crores per annum. There are three alternative principles according to which this amount can be allocated among the States. They are (1) compensation for loss of pre-existing sources of revenue; (2) collections of federal tax revenue from each State, as indicating the ultimate derivation or origin of that revenue; and (3) the population of each State, as a broad and simple indication of its fiscal needs.

The first principle is that which was originally adopted for the allocation of the income tax reimbursement grants in Australia, and it also figured in the pre-1957 Canadian Tax Rental Agreements. Unlike the Australian States or Canadian Provinces, however, the British Indian Provinces never had any independent fiscal rights but merely derived their tax powers by devolution from the Centre, and the question of compensation for loss of revenues therefore did not arise. The former Princely States were in a somewhat different position, but even here the integration agreements did not give them any rights to compensation in respect of either assets or revenues

transferred to the federal government. Some questions of compensation do arise in consequence of the reorganization of the States in 1956, particularly affecting Bombay and Mysore, and also in connection with the allocation of the additional excise duties imposed by the Union in 1957 in replacement of certain State sales taxes, but both these matters lie outside the field of tax sharing proper.

The second principle would, if adopted, result in an allocation similar to that which would prevail if tax sharing operated directly on the basis of the tax revenue collected by the federal government within each State or Province, as in Canada. The whole point of the Indian form of tax sharing on the basis of the revenue collected from the nation as a whole, however, is that it permits the adoption of some other principle of allocation which can take account of the fiscal needs of the States. This is the virtue of the population principle, in so far as fiscal needs are proportional to population.

The conflict between the collection principle and the population principle is particularly acute with respect to the allocation of the State share of income tax. Federal income tax collections in each State naturally reflect differences in income levels. Indian National Income statistics are not available on a State basis, but there is known to be a heavy concentration of taxable income in Bombay and West Bengal, nearly three-quarters of total income tax revenue being collected in those two States. The allocation of the divisible pool of income tax on the basis of collections would therefore involve much higher per capita payments to these States than to any of the others. This is open to two objections. The first is that the high taxable income of these States is at least in part derived from or earned in other States. The second is that the per capita need for State services in Bombay and West Bengal is not necessarily higher, and could well be less than in States with lower income levels. Allocation according to the population principle is not open to these objections, however, since it would result in each State receiving an equal per capita payment.

In his award of 1935, Sir Otto Niemeyer rejected the principle of allocating the State share of income tax exclusively on the basis of collections. Instead, he considered that substantial justice would be done by basing the allocation partly on the residence of taxpayers, and thereby on collections, and partly on the population of the States. In 1952 the first Finance Commission considered and rejected arguments by West Bengal for an interpretation of the Constitution which would necessarily require income tax to be shared with the States on the basis of collections only, and by Bombay for the view that collections should be the main basis of allocation. They expressed the opinion that fiscal need should be the "main criterion of distribution", and accepted population as "a broad measure of need". They did, however, decide to give some weight to collections in view of the local origin of many small business and personal incomes. They

therefore recommended that one-fifth of the divisible pool should be allocated on the basis of collections, and that the remaining four-fifths should be allocated on the basis of population.[60] In 1957, the second Finance Commission, after reviewing the conclusions of their predecessors and examining changes in the fiscal resources of the States, expressed the opinion "that the principle of collection can no longer be considered an equitable basis of distribution" and that it should be "completely abandoned in favour of population". However, in order to avoid too sudden a break with the past, they recommended that one-tenth of the State share of income tax should continue to be allocated on the basis of collections, and the remaining nine-tenths on the basis of population.[61]

The question of allocating a share of the revenue from excise duties did not arise for Sir Otto Niemeyer, but had to be faced by the two Finance Commissions. Since the divisible excise duties are levied on staple commodities in general use, their consumption is not likely to vary widely with income levels. Hence if collections reflected consumption, allocation according to the collection principle would not be seriously out of line with fiscal needs. However, an excise duty may be collected from producers in one State who derive the means to pay it from their sales to consumers in other States. Hence here also the collection principle is inferior to the population principle, but principally because it does not in this case adequately reflect the derivation of the tax revenue. The first Finance Commission recommended that in the absence of reliable statistics of consumption, the State share of excise duties should be allocated exclusively on the population basis, thereby giving each State an equal *per capita* share.[62] The second Finance Commission agreed that population was the best available principle of allocation, but instead of dealing with the whole of the net proceeds on this basis, as the first Commission had done, they allocated only nine-tenths of the proceeds according to population, and used the remaining one-tenth to make "adjustments", mainly at the expense of U.P. and Bombay, the two most populous States.[63]

Following the procedure adopted by Sir Otto Niemeyer, both Finance Commissions found it convenient to embody their recommendations in schedules, setting out the percentage share of each State (expressed to two places of decimals) in the divisible pool of each tax. The second Finance Commission's schedules for income tax and excise duties are set out below, together with the percentage distribution of population at the 1951 Census, which was the latest data available to the Commission and which is included for comparative purposes.

60. 1st F.C., pp. 71-77.
61. 2nd F.C., pp. 39-40.
62. 1st F.C., pp. 82-84.
63. 2nd F.C., p. 44.

State	Population 1951 Census %	Allocation of Income Tax %	Allocation of Excise Duties %
Andhra	8·76	8·12	9·38
Assam	2·53	2·44	3·46
Bihar	10·86	9·94	10·57
Bombay	13·52	15·97	12·17
Kerala	3·79	3·64	3·84
M.P.	7·30	6·72	7·46
Madras	8·40	8·40	7·56
Mysore	5·43	5·14	6·52
Orissa	4·10	3·73	4·46
Punjab	4·52	4·24	4·59
Rajastham	4·47	4·09	4·71
U.P.	17·71	16·36	15·94
West Bengal	7·37	10·08	7·59
Kashmir	1·24	1·13	1·75
	100·00	100·00	100·00

The second Finance Commission was also asked to report on the allocation of estate duty, the railway fares tax, and the additional Union excise duties in lieu of State sales taxes, which had been imposed since the report of the first Commission and the net proceeds of which are payable in their entirety to the States. In their recommendations concerning these taxes, in contrast to those concerning the State shares of income tax and excise duty, the population principle plays a minor role. They recommended that estate duty proceeds should be distinguished according as to whether they accrued from movable or immovable property. The former were to be allocated among the States on the basis of population, but the latter on the basis of the location of the property.[64] Again they recommended that the tax on railway fares, which is estimated to yield about Rs. 11 crores per annum, should be allocated on the basis of passenger traffic earnings in each State, as estimated from track mileage and traffic density.[65] With regard to the additional excise duties in lieu of State sales taxes, which have an annual yield of about Rs. 40 crores, the Commission was bound by the agreement between the Union and the States to assure to each State its previous income from the replaced sales taxes. This implied the adoption of the compensation basis, and the Commission's problem was largely the statistical one of determining actual State revenue from the replaced taxes in 1956-57. However, they also recommended that if the net proceeds of the new excise duties exceeded the sum of the guaranteed amounts, the excess should be allocated among the States on the basis of estimated consumption.[66] The comparatively minor role given to the population principle or to fiscal needs in the allocation of these taxes where no sharing is involved can perhaps be taken as a further indica-

64. *Ibid.*, pp. 51-52.
65. *Ibid.*, pp. 64-65.
66. *Ibid.*, pp. 59-63.

tion that they are collected by the Union on behalf of the States mainly as a matter of administrative convenience rather than as an instrument of financial adjustment.[67]

The adoption of the population principle as the chief basis for the allocation of the State shares of income tax and excise duties introduces a large element of adjustment for fiscal needs into the tax sharing system itself. This contrasts markedly with Canada where tax sharing has to be supplemented by National Adjustment Grants to bring the combined payment to each Province up to an equal per capita level. In India tax shares are also supplemented by grants-in-aid, but since the Indian tax sharing system itself establishes a more or less equal per capita payment for each State, the purpose of the grants-in-aid is, as we shall see, to provide additional payments for the financially weaker States. Both Finance Commissions recognized that the population principle provided only a rough-and-ready indication of fiscal needs, and did not adequately reflect the needs of States with relatively small, widely dispersed, poor or primitive populations. However, apart from the difficulty of measuring these factors statistically, they considered that a straight population basis was preferable to a complicated formula for tax sharing purposes, and that "specialized and particular measures" would be more appropriately taken account of in the determination of grants-in-aid.[68] Thus the Indian system of allocating tax shares among the States differs not only from the Canadian, but also from the Australian tax reimbursement system, which did try to allow for factors such as sparsity of settlement and proportion of school children in its "adjusted population" formula.

Grants-in-Aid

Grants from the Union to the States are comparable in importance with tax sharing in the Indian system of financial adjustment. Of the several types of grants provided for in the Constitution, particular interest attaches to grants-in-aid, since with the exception of those for scheduled tribes and areas they are given for general revenue purposes on the recommendation of the Finance Commission. They are therefore determined in conjunction with the allocation of tax shares. Unlike tax shares, however, they need not be given to all States nor allocated on a uniform basis, since neither individually nor collectively are the States entitled to them as of right. They also differ from tax shares in that they are paid out of general Union revenue, and therefore instead of being tied to the yield of particular taxes the grants payable can be determined in accordance with the residual needs of the States. Since the allocation of tax shares is based predominantly on population, all "specialized and particular measures" of State needs are left to be covered by differential grants-in-aid. Their function is thus more clearly delineated than that of

67. See above, p. 195 and p. 200. See also 2nd F.C., pp. 16-17.
68. 1st F.C., p. 75; and 2nd F.C., p. 39.

the Australian Special Grants, which are given to cover not *all* the special needs of the States, but only those which have not been embodied in the tax reimbursement grants.

In 1935, Sir Otto Niemeyer supplemented his scheme for the sharing and allocation of income tax by recommending grants-in-aid, amounting in the aggregate to about Rs. 3 crores, to the five provinces of Assam, Orissa, United Provinces, Sind and the N.-W. Frontier Province. These grants were in aid of general revenue, and no conditions were attached. They were intended to give each Province a reasonable prospect of balancing its budget and meeting its residuary needs after taking account of all other forms of assistance, and of the financial resources which the Centre could make available. The grant to United Provinces was for a limited period of five years, and various provisions for review or adjustment were attached to the grants payable to the other Provinces, but there was no arrangement for annual review, as in the case of the Australian Special Grants. They also differed somewhat in purpose, those payable to Assam and to the N.-W. Frontier Province in particular being necessary because of frontier problems which have no parallel in Australia. Subsequently, Partition accentuated such problems. The grants to Sind and the N.-W. Frontier Province lapsed with their inclusion in Pakistan, but it was found necessary to introduce new grants for the Punjab and W. Bengal, both of which had suffered from Partition.

In accordance with the Constitution, the Finance Commissions are required to report on the principles which should govern grants-in-aid as well as to recommend the actual amounts to be paid. After a survey of experience in India and other countries, including Australia, the first Commission listed six principles as relevant. They were:

(1) The Budgetary Needs of a State, subject to suitable corrections to ensure comparability with others;
(2) The Tax Effort of a State, allowance being made for "clear cases" of failure by a State to help itself by imposing higher taxation;
(3) Economy in Expenditure by a State, this being considered necessary to avoid introducing a premium on extravagance;
(4) Inferior Standards of Social Services, arising from special difficulties such as sparsity of population or economic backwardness;
(5) Disabilities arising from Special Obligations of National Concern, such as the consequences of Partition;
(6) Encouragement of Broad Purposes of National Importance, the Commission being of the opinion that grants-in-aid should not necessarily be completely unconditional provided that the purpose was "broad but well defined".[69]

On the basis of these principles, the Commission recommended

69. 1st F.C., pp. 96-98.

two types of grants-in-aid. The first were unconditional and general purpose grants-in-aid for seven States.[70] In addition to Assam and Orissa, which had received grants-in-aid since 1935, and the Punjab and West Bengal, which had been given grants after Partition, grants were recommended for three of the newly integrated but economically backward Princely States. These grants totalled Rs. 5·05 crores per annum, but taking into account the larger number of States involved the amount of assistance provided appears to be of a similar order to that recommended by Sir Otto Neimeyer. It also seems to have been determined in the same way by estimating the residuary needs of the States after taking account of their other resources including tax shares. Whereas Sir Otto Niemeyer's recommendations had, however, included various provisions for review or adjustment, the grants now recommended were fixed for a period of five years commencing 1952-53. Secondly, the Commission, in line with its view that grants-in-aid could be given for broad purposes of national importance, recommended grants for fostering primary education in eight States where less than 30 per cent. of school-age children actually attended school. The total amount payable was to be Rs. 1·5 crores in 1953-54 (*i.e.*, the second year of the quinquennium) and was to rise to Rs. 3·0 crores in 1956-57. The States were to have full discretion in utilizing these grants in the broad field for which they were intended, but it was suggested that annual reports should be submitted and that the progress achieved should be reviewed by the next Commission.[71]

Finally, it may be recalled that the four jute-growing States, each of which qualified for assistance under one or other of the above heads, were also entitled to general purpose grants-in-aid by way of compensation for their former share of the export duty on jute. On the recommendation of the Finance Commission these grants were fixed at Rs. 3·15 crores per annum.[72]

The second Finance Commission was required by its terms of reference to take account of (1) the requirements of the second Five-Year Plan which had come into operation in 1956; and (2) the efforts made by the States to raise additional revenue from their own resources. The first point led the Commission to extend the concept of fiscal need to cover not only the ordinary budgetary needs of the States, but also their revenue expenditure under the Plan, and for this reason they recommended substantially increased grants.[73] They even contemplated making their grants conditional on the implementation of the Plan, but refrained from doing so because the grants were not expected to provide more than one-third of the necessary finance.[74]

70. *Ibid.*, pp. 101-2.
71. *Ibid.*, pp. 103-4.
72. *Ibid.*, pp. 85-89.
73. 2nd F.C., p. 46.
74. *Ibid.*, p. 50.

The second point raised the question of the interpretation of their predecessors' six principles, the second of which referred to tax effort. While regarding those principles as "unexceptionable", the Commission observed that it was difficult in practice to determine the degree of a State's tax effort, or even to be sure of "clear cases" of inadequate effort. However, they accepted as an empirical test of tax effort a State's record in fulfilling its promise to raise additional revenue for the Plan.[75] There appears to have been no investigation comparable to that made each year by the Commonwealth Grants Commission in calculating its adjustments for severity of State taxation in Australia. Another respect in which the second Finance Commission found it desirable to modify the application of their predecessors' principles concerned grants-in-aid for broad national purposes, such as education. While not disapproving of such grants in principle, they considered that the levelling up of social service standards in the various States was primarily a task for the Planning Commission and the National Development Council. Consequently, they did not recommend the continuance of grants-in-aid for primary education.[76]

The Commission's final recommendations provided for unconditional general purpose grants-in-aid to eleven of the fourteen States. In total the grants amount to Rs. 36·25 crores per annum for the first three years of the present quinquennium, and to Rs. 39·5 crores per annum for the last two years, this increase being intended to compensate the four jute-growing States for the loss after 1960 of the grants totalling Rs. 3·15 crores per annum which they have received in lieu of a share in the export duty on jute. Apart from this complication, the present grants are about four times as large as those being paid at the end of the previous quinquennium. Moreover, from being little more than one-tenth they have now increased to one-third of the aggregate tax share of the States. Their true significance, however, lies not in their total amount but in their allocation among the States, and particularly in their per capita allocation.

The following table sets the grants-in-aid recommended by the second Finance Commission against the estimated tax shares for 1959-60. Whereas the grants-in-aid are nil in Bombay, U.P. and Madras, they are about equal to or greater than the tax shares in Assam, Mysore and Kashmir. In the remaining eight States they generally amount to about half the tax share. It will also be seen that the tax shares are so allocated as to give each State about Rs. 3 per head (Rs. 2 in respect of income tax, and R. 1 in respect of excise duties), but the grants-in-aid range from nil to nearly Rs. 5 per head in Assam and Rs. 7 per head in Kashmir. Thus whereas the application of the population principle to tax sharing largely eliminates the effect of differential taxable capacity, the grants-in-aid introduce a differentiation in favour of the States with the greatest relative

75. *Ibid.*, p. 24.
76. *Ibid.*, p. 25.

needs. That neither tax shares nor grants-in-aid amount to more than a few rupees per head is a significant commentary on India's poverty, and her numbers. By way of comparison it may be noticed that in Canada federal payments to the Provinces amount to about $40 per head, and in Australia financial assistance and special grants to the States range from about £20 to over £40 per head.

State	Tax Shares		Grants-in-Aid		Total	
	Rs. crores	Rs. per cap.	Rs. crores	Rs. per cap.	Rs. crores	Rs. per cap.
Andhra	9·42	3·01	4·00	1·28	13·42	4·29
Assam	3·04	3·36	4·50*	4·97	7·54	8·33
Bihar	11·24	2·90	4·22*	1·09	15·46	3·99
Bombay	16·50	3·42	—	—	16·50	3·42
Kerala	4·10	3·03	1·75	1·29	5·85	4·32
M.P.	7·70	2·95	3·00	1·15	10·70	4·00
Madras	9·05	3·02	—	—	9·05	3·02
Mysore	6·15	3·17	6·00	3·09	12·15	6·26
Orissa	4·37	2·98	3·40*	2·32	7·77	5·30
Punjab	4·82	2·99	2·25	1·39	7·07	4·38
Rajasthan	4·74	2·97	2·50	1·57	7·24	4·53
U.P.	18·02	2·85	—	—	18·02	2·85
W. Bengal	10·39	3·95	4·78*	1·82	15·17	5·77
J. & K.	1·46	3·31	3·00	6·80	4·46	10·11
	111·00		39·40		150·40	

* Including grants in lieu of export duty.

Perhaps the most remarkable feature of the Indian grants-in-aid is that they are fixed in advance for five years at a time. For that period the States are certain to receive them, and the Union government is committed to pay them. This rigidity contrasts with the comparative flexibility of the tax sharing system. It also means that grants-in-aid have to be based on forward estimates rather than on a *post hoc* review of actual budget results such as that undertaken in Australia by the Commonwealth Grants Commission. The first Finance Commission did state that they had based their assessment "largely on the financial position of the States as disclosed by actual revenue and expenditure in recent years, corrected where necessary with reference to budget estimates for the year 1952-53 and such subsequent information as became available".[77] It is also true that both Commissions reviewed trends in State revenue and expenditure in the years prior to their appointment. Unlike the Commonwealth Grants Commission, however, they did not base their recommendations on the precise amounts found necessary to reduce the budget deficits of the weaker States to the same average per capita level as those of the stronger States, with specific "corrections" to ensure comparability, and "adjustments" to allow for the degree of effort shown in the raising of revenue or the control of expenditure. It would, in fact, be unrealistic to base grants for a five-year period on

77. 1st F.C., p. 101.

such a close examination of the audited accounts of a single past year. Regard must necessarily be had to expected future changes, and both Commissions required the States to submit forecasts of revenue and expenditure over the ensuing five years. Presumably it was in the light of these forecasts that the second Commission recommended grants-in-aid for most of the States despite the fact that nearly half of them had experienced surpluses during the four years ended 1955-56.[78] Obviously, however, such long-range forecasts cannot be firm estimates of the type which a government submits to Parliament in its annual budget. They may, in fact, prove to be seriously astray particularly in a period of rapid economic development. This is what seems to have happened in India.

"Public Purpose" Grants : Conclusion

It will be appropriate to conclude this study by examining the impact of the first and second Five-Year Plans on federal-State finances and on the schemes propounded by the two Finance Commissions. The development expenditure under the Plans has imposed heavy strains on the economy and has had fiscal consequences for the States that were not foreseen by the Finance Commissions, nor by the planners themselves. In particular, it has entailed considerable additional grants to the States, outside the schemes framed by the Finance Commissions.

To some extent these difficulties have been due to lack of co-ordination. The five-year periods with which the Finance Commissions have been concerned have lagged one year behind the Plan periods. The first Commission was not required to have regard to the needs of the first Plan, and made no provision for its financing in its recommendations. The second Commission was required by its terms of reference to take account of the needs of the second Plan, but found difficulty in dovetailing its work with the Plan, partly because of the difference in dates and partly because the Plan does not distinguish between revenue and capital expenditure. It therefore proposed that the periods with which future Finance Commissions were concerned should coincide with Plan periods, and that the necessity of making two separate assessments of the needs of the State should be avoided.[79]

Had it not been for the requirements of the first Five-Year Plan (which ran from 1951 to 1956) the recommendations of the first Finance Commission (which covered the period 1952 to 1957) would have been "quite liberal in relation to the normal expenditure of the States and for most of them left a substantial margin".[80] The second Commission estimated that these surpluses would in the absence of the Plan have outweighed deficits to the extent of Rs. 66 crores. In fact, however, the requirements of the Plan imposed additional revenue expenditure of Rs. 333 crores on the States and con-

78. 2nd F.C., p. 27.
79. *Ibid.*, p. 13.
80. *Ibid.*, p. 26.

verted the potential overall surplus into an overall deficit of Rs. 57 crores. For the rest the States raised Rs. 77 crores from additional taxation (although this was only about one-third of the original target assumed by the Plan), and they received Rs. 133 crores in the form of conditional and specific purpose grants from the Union government.[81]

These grants were given under the extremely wide "public purpose" power conferred by Article 282 of the Constitution, and lay entirely outside the scheme of the Finance Commission. In 1951-52 grants under this power amounting to nearly Rs. 8 crores were allocated among the States, and their main purposes were rehabilitation and the "grow more food" campaign started during the war. By 1955-56, however, "public purpose" grants amounting to Rs. 52 crores were allocated among the States, their main purposes being community development projects and other aspects of the Plan.[82] At this level they not only greatly exceeded the grants-in-aid, but were nearly equal to the State share of income tax.

The second Finance Commission's recommendations in favour of higher tax-shares and grants-in-aid to the States were in part an attempt to reverse this trend. The Commission assumed that in the period with which it was concerned development expenditure would be on the same scale as in the second Five-Year Plan. It estimated that the additional revenue expenditure imposed on the States would amount to Rs. 709 crores, which was more than double that required by the first Plan. It was also assumed that the States would be able to raise Rs. 206 crores by additional taxation, and that they would receive "public purpose" grants amounting to Rs. 275 crores over the five-year period. The Commission hoped, however, that the remaining gap of Rs. 228 crores would be covered by its recommended increases in the tax-shares and grants-in-aid payable to the States.[83] It estimated that these recommendations involved an annual payment of about Rs. 140 crores to the States as compared with an average of Rs. 93 crores under the first Commission's scheme.[84] Over five years the increase would amount to Rs. 235 crores which would be more than sufficient to enable the States to cover their remaining revenue expenditure under the Plan. Moreover, if "public purpose" grants were limited to Rs. 275 crores, *i.e.*, to Rs. 55 crores per annum, they would be substantially smaller than the increased share of income tax payable to the States under the Commission's recommendations, and not so greatly in excess of the grants-in-aid as was formerly the case.

In fact, actual experience indicates that these expectations are likely to be astray in several particulars. The expenditure by the

81. *Ibid.*, pp. 10, 26-29.
82. *Ibid.*, App. XIII, Tables 5 (a) and (e), and 11 (a) and (e). Further unallocated sums of Rs. 4 crores in 1951-52 and Rs. 23 crores in 1955-56 were also available for these purposes.
83. *Ibid.*, pp. 47, 71-72.
84. *Ibid.*, pp. 80-81.

States on their normal activities outside the Plan has been greater than anticipated, thereby reducing the resources available for financing the Plan, expenditure on which has lagged substantially. The tax effort of the States has fallen short of the Plan target by about 20 per cent., the short-fall being particularly serious in respect of land revenues.[85] On the other hand, the annual payments to the States from the Union are greater than expected because of higher income tax yields. Finally "public purpose" grants, so far from being stabilized, have tended to increase, and in the current Budget appear to be about Rs. 100 crores, although not all of this amount may be actually allocated among the States.

Included among the "public purpose" grants provided under both the first and second Five-Year Plans have been a large number of matching grants. Matching grants are, of course, quite common in the United States, and in Australia the matching principle has recently been applied to University grants and to the supplementary portion of the new Commonwealth Road Grants. In India, the second Finance Commission observed that the State governments had generally found it politically impossible to refuse such grants, even though they lacked the resources to meet their share of the expenditure without incurring larger deficits. In these circumstances, federal tax shares and grants-in-aid might eventually have to be increased to enable the States to balance their Budgets, and the Commission commented that "if this happens the whole purpose of matching is lost". A similar comment would perhaps not be inappropriate so far as matching grants in Australia are concerned. The Commission also pointed out that matching grants designed to stimulate the States to undertake particular services had no place under an "integrated and comprehensive Plan" such as operated in India. Finally, they endorsed the more familiar argument that matching grants are inequitable, since the wealthier States are better able to take advantage of them than the poorer States. For all these reasons, the Commission expressed the opinion that "matching grants are not suitable in present conditions".[86]

Despite these criticisms conditional and specific purpose grants, often with matching conditions attached, continue to play a major role in the Indian scheme of federal-state finance. In this particular respect Indian federalism has come to have closer affinities with the United States than with Australia or Canada, where specific purpose grants are comparatively unimportant. Such a development can hardly have been envisaged when the Constitution was framed. However, a system under which general purpose grants-in-aid are frozen for five-yearly periods requires a certain degree of stability for its satisfactory operation. It is ironical that the Five-Year Plans, so

85. *Appraisal and Prospects of Second Five-Year Plan* (Planning Commission, New Delhi, 1958), pp. 13, 20.
86. 2nd F.C., p. 69.

far from increasing stability, have in fact reduced it and made prediction more difficult. It is in these circumstances that the "public purpose" grants have emerged as the most flexible element in the fiscal scheme and the channel through which additional funds are made available to the States to help them implement the Plans.

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ECONOMIC ASPECTS OF PASTURE IMPROVEMENT IN THE AUSTRALIAN WOOL INDUSTRY*

"And he gave it for his opinion, that whoever could make two ears of corn or two blades of grass grow upon a spot where only one grew before, would deserve better of mankind, and do more essential service to his country than the whole race of politicians put together."—GULLIVER'S TRAVELS.

This paper discusses some economic effects of making two blades of grass grow where only one grew before. And shows that Jonathan Swift's judgment—though widely held—may require modification in the particular case of the Australian wool industry.

The rapid expansion of the area under improved pastures has been a major post-war development in Australian agriculture. This discussion will be confined to a description of the innovation and its effects on the volume and composition of farm output and incomes; it will ignore the economic problems confronting the farmer who embarks on a pasture improvement programme.

(a) *Technical*

The main purpose of pasture improvement is to increase and improve the supply of feed available to sheep. Subsidiary aims may be to control erosion, to reduce the risk of stock losses in bad seasons and the cost of supplementary winter feeding. The basic process of pasture improvement consists of stimulating plant growth by the use of fertilizers on pastures and the complete or partial replacement of inferior native pasture species by higher yielding and more nutritious exotic (*i.e.* non-native) plants.

Australian soils are generally inadequately supplied with phosphates and nitrogen—apart from deficiencies in specific soils of minor elements such as manganese, copper, molybdenum, etc. Most pasture improvement programmes rely on the use of superphosphate fertilizer to overcome the shortage of phosphoric oxide. The nitrogen deficiency is usually overcome by the introduction of pasture plants known as legumes. Legumes have the capacity of taking nitrogen from the soil air and converting it to organic nitrogen which then becomes available to plants. A wide variety of clovers—of which the various strains of subterranean clover are the most important—usually supply the legume "base" of most Australian pasture improvement programmes. It is technically possible and indeed much faster to dispense with legumes and to use nitrogenous fertilizer. However, it is much more

* I am indebted to Drs. W. E. G. Salter and I. F. Pearce for helpful comments and criticism. I have also benefited from discussion with Mr. A. G. Powell who has been interested in a similar problem. This paper is a part of a more comprehensive study on pasture improvement for the Wool Seminar of the Australian National University.

expensive to build up fertility and feed volume in this way.[1] In some Western European countries where the price of nitrogenous fertilizers is considerably lower than in Australia, and where the price of animal products is comparatively higher, nitrogen fertilizer applications are quite common and of increasing importance. However, in Australia prevailing price relationships make it unlikely that the use of such fertilizers on pastures will become of major significance in the foreseeable future.

The mechanical methods of introducing fertilizer and pasture seed into the soil vary widely according to different physical and economic conditions on farms. Here it should be mentioned that the various practices of fertilizer and seed introduction are relatively simple techniques which do not normally require the acquisition of any new or very difficult skills.[2] However, there are other factors which impede the adoption of a rapid pasture improvement programme. Firstly, it is a relatively costly technique—total costs may range from one-third to five times the original market value of the grazing country before pasture improvement. Secondly, climatic conditions may limit the areas sown to new pastures in any one year.

Lastly, the increased volume of feed produced makes necessary certain changes in farm management which, in the aggregate, amount to a wholesale re-organization of the farm. Such changes include an increase of 100 per cent. or more in stock numbers when the *whole* farm is improved and the consequent additions to watering facilities, shearing sheds, fencing, etc. Furthermore, feeding on improved pastures makes sheep and cattle more prone to metabolic disorders. These include Bloat, Hypocalcaemia, Hypomagnesaemia, Phalaris staggers and Rye grass staggers in sheep. Apart from disorders attributable directly to improved pastures, the mere concentration of more stock in any given area leads to an increased incidence of some diseases such as footrot and worm infestation.[3] The adoption of a vigorous pasture improvement programme therefore requires con-

1. Donald and Williams have sampled soils from 44 paddocks in the Crookwell district of New South Wales where the previous fertilizer history was known. Regression analysis of soil nitrogen in the surface 4 in. of soil on amount of superphosphate previously applied showed a linear relationship ($p < 0{\cdot}001$) with each cwt. of superphosphate leading to the addition of 85 lbs. of nitrogen per acre—equivalent to approximately 3½ cwt. of sulphate of ammonia. The cost of this quantity of sulphate of ammonia is approximately £14 compared with less than £1 per cwt. of superphosphate. "Fertility and Productivity of a Podzolic Soil as influenced by Subterranean Clover (Trifolium Subterraneium L) and Superphosphate" by C. M. Donald and C. H. Williams, *Australian Journal of Agricultural Research*, vol. 5, 1954, p. 673.

2. In some cases—*e.g.* on problem soils—the correction of trace element deficiencies and the need for pasture seed inoculation may require a high level of skill. Also on some properties cultivation itself is a new technique. But by and large the process of pasture improvement as such is not particularly difficult.

3. It would be incorrect to create the impression that pasture improvement leads to a vast increase in disease problems with sheep. Certain other diseases produced or enhanced by malnutrition on natural pastures are avoided when feeding is raised to a higher level of nutrition; the point stressed here is that *new* possible dangers arise which will require new managerial techniques to cope with them.

siderable managerial skill to cope with the manifold technical and financial problems which are likely to arise.

(b) *Economic*

The economic effects of an innovation may manifest themselves in many directions. All innovations raise output; they may either raise or lower total costs. An innovation may affect the composition of the output of a firm producing two or more products, and lastly it may affect the composition of the inputs used. Pasture improvement usually affects both the volume and composition of output and also the level and composition of inputs.

(i) *The volume of output.*

The most important economic characteristic of pasture improvement, like that of other biological innovations, is that it raises output. The resultant increase in production will vary widely according to the situation of the farm and the amount of capital invested per unit of land. As mentioned earlier, increases of 100 per cent. or more in gross output from a given area have been quite typical. The measurement of the actual response under farm conditions raises difficult problems of interfarm comparison or comparisons on a single farm over time which have been discussed frequently by agricultural economists.[4] It can be shown that each of the possible measures of the resulting change in production has a number of more or less serious drawbacks which make it difficult to get an accurate assessment of this response under farm conditions.

Table I gives a number of estimates of the increases in wool production per acre from established improved pasture on different farms or groups of farms. These estimates are based on the relatively few available studies of pasture improvement under farm conditions. For New South Wales—where most of the studies have been carried out—increases of 6 to 12 lbs. of wool per acre seem to be typical. There are only two estimates available for Victoria and South Australia, which suggest that the increases obtained there may be considerably greater.

It would be of interest to ascertain what proportion of the increase in the Australian wool clip over any recent period can be attributed to pasture improvement. In the short run—which in this case can easily be as long as five years—seasonal conditions are likely to obscure the production effects. This is partly because year to year production changes resulting from seasonal conditions will usually

4. See, for example, E. O. Heady, *Economics of Agricultural Production and Resource Use* (Prentice Hall Inc., New York, 1952), ch. 10. With respect to pasture improvement the problem of interfarm comparisons has been examined by Ross Parish and J. L. Dillon, "Estimation of Stocking Rates by Multiple Regression Analysis", *Review of Marketing and Agricultural Economics*, vol. 24, no. 3, September 1956, pp. 166-172. The difficulties of comparisons on one farm over time have been less exhaustively treated; see, however, "A Study of the Economics of Pasture Improvement on Selected Farms in N.S.W.", by R. T. Shand (unpublished M.Sc. thesis, Fisher Library, University of Sydney).

exceed those which one would expect from pasture sowings. In addition, during a spell of good seasons farmers in the drier areas retain the natural increase of their sheep flocks instead of selling them to growers in the areas suited for pasture improvement. This reduces the potential increase in sheep numbers in the improved pasture zone. However, over a long period the cumulative effect of investment and development will be paramount.[5]

Between 1936-39 and 1955-58 the Australian average annual wool clip increased by 474 million pounds. Between 1939 and 1956 the area under sown grasses and clovers increased by 18½ million acres. Assuming that 90 per cent. of the increase in improved pastures took place on sheep properties, and that the average increase in output per acre was 10 lbs. of wool, the increase in wool output resulting from pasture improvement amounts to 166 million lbs., or 35 per cent. of the increase in wool production since the beginning of World War II.[6] This can be little more than a guess of the increase attributable to pasture improvement. The value of such an exercise is questionable but for what it is worth it confirms the popular notion that pasture improvement has been one of the major factors contributing to the post-war increase in wool production.

(ii) *The composition of output.*

The effect of pasture improvement on the composition of output will differ according to the area being considered. In those sections of the wheat belt where pasture improvement is possible, it increases the profitability of sheep relative to wheat. In theoretical terms pasture improvement raises the marginal rate of substitution of wheat for sheep over the relevant sections of the production possibility curve. It is difficult to observe this shift in practice as relative prices of wheat, wool and fat lambs are likely to change over time. Suggestive

5. A comparison of 1956 with, say, 1943 or 1939, shows a markedly greater increase in sheep numbers in the high rainfall and wheat-sheep zones where pasture improvement and certain other intensive developments are possible than in the pastoral zone where development opportunities are much smaller. But sheep numbers increased at a similar rate in some drier and some more favoured rainfall areas between 1950 and 1956.

(6) The assumption of 90 per cent. is based on the following considerations: An estimate of the area under improved pastures used for wool production is possible from a special tabulation made by the Commonwealth Bureau of Census and Statistics in 1955-56. Of a total of 28·46 million acres under sown grasses in 1956, approximately 7·11 million acres, or 25 per cent., were situated on farms not running sheep. However, this second figure includes approximately 1·75 million acres under Paspalum Dilatatum in the coastal areas of New South Wales. Such pastures are not fertilized and normally excluded from the category of "improved pastures". (There has been little change in this total acreage over the relevant period.) Over 80 per cent. of the area under improved pastures is therefore found on farms running sheep. In view of the relative prosperity of the sheep and dairying industries over the post-war decade, it seems reasonable to assume that the percentage increase of the improved pasture acreage used for wool production has been somewhat greater than that for dairy production.

The estimate of 166 million lbs. does not include production increases from fertilized natural pastures—which could possibly add another 10-20 million lbs. to the figure.

TABLE I

Wool Production and Annual Costs per acre of Improved Pasture

Farm No.	Location	Increase in Wool Production* per acre of improved pasture	Increase in Annual Costs† per acre of improved pasture	Information based on
		lbs.	£	
A	Oberon Shire, Central Tablelands, N.S.W.	6·1	3·89	Single farm case studies; farmers' records of changes over time.
B	Molong Shire, Central Western Slope, N.S.W.	12·1	1·81	
C	Bibbenluke Shire, Southern Tablelands, N.S.W.	6·8-14·9	0·61-1·35	
D		6·4-7·8	1·35-1·66	
E		8·8-10·5	1·22-1·50	
F		18·0	1·48	
G	Northern Tablelands, N.S.W.	9·8	1·48	Average of 11 farmers, farmers' records used for interfarm comparison.
H	near Hamilton, Western District, Vic.	21·4	n.a.	Average of 10 farmers, farmers' records of changes over time—(uncorrected for seasonal fluctuations).
I	Northern Tablelands, N.S.W.	9·6	1·77	Average of 13 farmers, farmers' estimates and records of changes over time (Aerial Pasture Improvement).
J	South and Central Western Slopes, N.S.W.	10·5	2·18-3·27	Average of 71 farmers' estimates of changes over time.
K	Upper South-East, S.A.	26·0	4·12	Personal experience of large scale development in the area.

* For farms A-F increase in seasonally corrected wool production per farm (between 1955-56 and the post-war base period before pasture improvement commenced), divided by the area under improved pastures in 1954-55. (Most of the area improved had been sown before 1953-54.) On farms C, D, E, some pre-war pasture sowings had persisted without superphosphate dressing during the war. The alternative figures on those farms are based on the two limiting assumptions (a) the increase in production per acre of pre-war sown pastures was the same as the post-war sown pastures, and (b) there was no increase in production per acre of pre-war sown pasture on such farms. For G, the increase is the regression coefficient between increases in production (seasonally corrected) for an average of 11 farms and area improved over a 10 year period. This is likely to produce an under-estimate of the productivity of developed pastures. For I and J, farmers' estimates are based on productivity increases four years after the pasture is sown. For K, increased productivity after five years is given.

† For farms B-G, this includes 5% interest on establishment capital costs plus maintenance cost, except for the additional costs associated with running more stock (shearing, etc.). For A, costs of running more stock are included, but interest on capital costs of acquiring extra stock are not. For I, J, and K, costs include annual costs of running more stock and 5% interest on capital investment including acquiring extra animals.

Sources for Table I.—Farms A-F: *An Economic Study of Pasture Improvement on some Farms in N.S.W.* by Keith O. Campbell and Richard T. Shand, Mimeographed Report No. 2, Department of Agricultural Economics, University of Sydney, 1958. G: "Economics of Pasture Improvement", Bureau of Agricultural Economics, roneod November, 1958. H: "Some Technical Aspects of Wool Production on Improved Pastures in the Western District of Victoria and the South-East of South Australia" by P. G. Hyland, *Proceedings of Bankers' Residential Conference on Pasture Improvement and Land Development,* May, 1958. I: "Aerial Pasture Improvement in New South Wales" by F. H. Gruen and R. A. Pearse, *Review of Marketing and Agricultural Economics,* vol. 26, no. 2, June 1958. J: "Financial Aspects of Pasture Improvement on Southern Wheat/Sheep Farms" by F. H. Gruen, *Review of Marketing and Agricultural Economics,* vol. 24, no. 4, December, 1956. K: "Land Settlement in Australia" by W. Edgerley, *Proceedings of Bankers' Residential Conference on Pasture Improvement and Land Development,* May, 1958.

evidence can be obtained from a comparison of changes in wheat acreages in those regions where pasture improvement is taking place with those where it is not possible. McLennan has shown that the reduction in wheat acreages in Australia between 1949-50 and 1954-55 has been particularly marked in those safer, higher rainfall sections of the wheat belt where pasture improvement has expanded most rapidly.[7] Wheat acreage movements in Queensland, New South Wales, Victoria and to a lesser extent in Western Australia seem to fit this pattern. However, the evidence is not conclusive, as the shape of the production possibility curves in the two groups of areas is not known.[8]

The greater relative profitability of sheep when pastures have been improved results from two factors: (a) While wheat yields (and net incomes from wheat production) increase considerably when an improved pasture phase is incorporated in a wheat rotation, such increases are normally proportionately smaller than those obtained in wool and fat lamb production.[9] (b) Pasture improvement often requires a reduction in the acreage devoted to wheat growing if the full productivity of improved pastures is to be obtained and shorter rotations are to be avoided. This consideration applies mainly to the smaller farms in the wheat belt where some 25-30 per cent. of the farm area was normally sown to wheat before pasture improve-

7. "Movements in Wheat Acreage in Australia", by L. W. McLennan, *Quarterly Review of Agricultural Economics,* vol. IX, no. 1, January 1956.

8. It is theoretically possible that the elasticity of substitution in areas suitable for pasture improvement was sufficiently greater to produce such a change from wheat to sheep as a result of changing product prices—in the absence of this innovation. Another possibility is that the change in relative input prices, coupled with a different production possibility curve, has affected the relative magnitude of the shift. However, both these seem rather far-fetched.

9. This consideration applies to the production possibility curve for the land resource—which may not be limiting in any particular instance. However, it is probably more difficult to increase on most farms than the other resources used in conjunction with land.

ment. Table II shows that it is on these farms that the decline in wheat acreages has been particularly great in the post-war decade.[10]

In the high rainfall areas (*i.e.* east and south of the wheat belt in south-eastern Australia) pasture improvement may affect the relative profitability (*i.e.* the marginal rates of substitution) of wool, beef, fat lambs and dairying. These effects may vary within the high rainfall zone and, as yet, insufficient empirical studies have been undertaken to identify the changes in relative profitability which are likely to take place. But some general observations may indicate the possible types of responses. The better quality of feed produced as a result of pasture improvement makes it possible for graziers to sell lambs and beef cattle in fat condition and to market dairy products where previously the production of wool and the disposal of sheep and cattle in store condition were the only possible enterprises. However, the mere possibility of enlarging the range of enterprises does not ensure their adoption. The relative prices obtained for these products will determine whether graziers utilize the better quality feed available to increase the production of wool or of some other commodity. There has been no evidence so far to indicate any major shifts in enterprise combinations in the high rainfall zone as a result of expanded pasture sowings. Some individual cases of shifts towards fat lamb production have occurred—for instance in New South Wales —but it is difficult to discern these trends from aggregate statistics. But the possibility of making such shifts may become important if there is a marked decline in the profitability of wool production.

A group of research workers at the University of Sydney have investigated the economic relationship between beef cattle and sheep in three areas where pasture improvement has been of growing importance.[11] In the absence of experimental data it was not possible to ascertain the shape of the relevant production possibility curves. At the sheep/cattle ratios used by graziers, there appears to be a complementary relationship between the two enterprises. In other words, running cattle seemed to add to the number of sheep which could be carried. It was suggested that the greater the intensity of grazing the smaller the complementary effect of cattle. On most properties cattle were utilized to control tall and coarse herbage. Pasture improvement can avert the coarse feed problem without running cattle—but only if properties are stocked at unusually high rates. At the wool/beef price ratios ruling prior to 1955 the effect of pasture

10. This trend could have been the result of other factors, such as the relative decline in wheat-growing in the higher rainfall sections of the wheat belt where holdings tend to be smaller. Full information is not available for years other than 1947-48 and 1955-56. However, one survey in N.S.W. showed a similar trend between 1950-51 and 1952-53; c.f. "Attitudes and Expectations of Wheat Growers in N.S.W.", by D. B. Williams, Ross Parish and A. G. Bollen, *Review of Marketing and Agricultural Economics*, vol. 21, no. 1, March 1953, p. 35.

11. "Economic Aspects of the Association of Beef Cattle with Sheep Production in South-Eastern Australia", by Keith O. Campbell and Warren F. Musgrave, Research Bulletin No. 3, Department of Agricultural Economics, University of Sydney, 1958.

TABLE II

Changes in Australian Wheat Acreages by Size of Farm; 1947-48 – 1955-56

Size of Farm	Total Area Sown to Wheat			Number of Holdings Growing Wheat			Average Wheat Acreage per Holding Growing Wheat		
	1947-48	1955-56	1955-56 as % of 1947-48 *	1947-48	1955-56	1955-56 as % of 1947-48	1947-48	1955-56	1955-56 as % of 1947-48 *
Acres	000 acres	000 acres	%	No.	No.	%	Acres	Acres	%
10,000 and more	327	385	117·9	569	636	111·8	573·9	605·5	105·5
5,000-9,999	897	1011	112·8	1,837	2,203	119·9	488·1	459·0	94·0
2,000-4,999	3911	3467	88·6	9,685	10,592	109·4	403·8	327·3	81·1
1,000-1,999	4530	2973	65·6	14,545	13,855	95·3	311·5	214·6	68·9
900-999	680	407	59·9	2,643	2,436	92·2	257·3	167·2	65·0
800-899	605	353	58·3	2,622	2,384	90·9	230·8	147·9	64·1
700-799	565	321	56·9	2,716	2,352	86·6	207·9	136·5	65·7
600-699	827	450	54·4	4,257	3,515	82·6	194·2	128·0	65·9
500-599	521	276	53·0	3,286	2,652	80·7	158·6	104·2	65·7
400-499	425	209	49·2	3,224	2,423	75·2	131·8	86·3	65·4
300-399	306	169	55·4	3,171	2,514	79·3	96·4	67·4	69·9
200-299	159	80	50·2	2,259	1,779	78·8	70·5	44·9	63·7
100-199	101	48	48·0	2,053	1,454	70·8	49·0	33·2	67·8
50-99	21	12	58·5	704	532	75·8	29·8	23·1	77·5
1-49	7	4	62·8	448	302	67·4	14·6	13·6	93·2
Total	13,880	10,166	73·2	54,019	49,629	91·9	257·0	204·8	79·7

* Percentages relate to figures before rounding off.

Sources: Size classification of Rural Holdings 1955-56, Bulletin No. 7, Australia. Production Bulletin 1947-48, No. 42, Part II Primary Industries, Section XIV. Both published by the Commonwealth Bureau of Census and Statistics.

improvement on the profitability of sheep versus cattle had been slight; a major long-run change of the wool/beef price relationship could alter this, however.

The use of improved pastures leads to a slight coarsening of the wool fibre. An experiment to determine the effect on superfine wool was carried out by research workers of the Council of Scientific and Industrial Research in the late 'thirties. They found no evidence of a progressive coarsening of the wool fibre though some coarsening was observed. "In the classer's estimate, the wool of the improved pasture group was in general of the 70/74's type with a small proportion of 80's wool, while that of the natural pasture group was of 74/80's type with a much smaller proportion of 70's than in the other group. It is probable that to a certain extent, because of the longer staple of the improved pasture wool these were classed as being of lower count than would have been the case had their count been based on actual fibre measurements."[12]

As shown in Table III there has been a significant change in the proportion of fine and coarse wools in the Australian wool clip since records were first compiled at the beginning of World War II. While this change is the result of a number of factors including good seasons, the spread of myxomatosis and the smaller proportionate increase in the lower rainfall areas where finer counts predominate, the spread of pasture improvement has probably contributed significantly to this trend.

TABLE III

Change in the Quality Composition of the Australian Wool Clip

Quality Count	1940-41		1955-56	
	Percentage	No. of bales 000's	Percentage	No. of bales 000's
70's and above	6·2	201	2·1	87
64/70's	20·8	679	10·2	425
60's - 64's	58·3	1,901	61·3	2,554
Below 60's	14·7	480	26·4	1,102
		3,261		4,168

Source: R. B. MacMillan, "Changes in the Quality Composition of the Australian Wool Clip", *Wool Technology*, December 1957.

(iii) *The effect on inputs.*

Unlike many biological innovations (*e.g.* myxomatosis, new crop varieties, etc.) pasture improvement usually requires substantial capital investment. The actual level of this investment varies widely from farm to farm, but in most cases increased expenditure per acre of sown pasture will exceed 30 per cent. of the (pre-improvement)

12. *The Grazing of Sheep on Improved Pastures : Its Effect on Superfine Wool*, by I. Clunies Ross, N. P. H. Graham, Helen Newton Turner, H. B. Carter and H. Munz. C.S.I.R. Pamphlet 71, 1937.

value of the land. The expenditure incurred can be classified into three categories—(a) that necessary before new pastures can be sown. On many farms (especially in the wheat belt) there would be little or no capital expenditure in this group. On most farms in the high rainfall zone, expenditure on clearing and machinery purchases would be necessary. (b) Expenditure on pasture sowings. This item includes fertilizer, seed, fuel and maintenance costs of machinery or charges for contract work (either by ground methods or aircraft). (c) Ancillary capital expenditure required to obtain maximum economic benefit from the pasture investment. This includes the acquisition of extra stock—either by purchase or reducing off-farm sales—structural improvements such as dams, sub-divisional fencing (this may also be required under (a)), erection or enlargement of buildings for machinery, fertilizer and any additional permanent labour employed.

Furthermore, total annual cash costs will be increased by the purchase of fertilizer (in the years following pasture sowings), extra cash costs of running more sheep, selling additional quantities of wool, and possibly further disease control measures. Professor J. N. Lewis has suggested that "Price instability [of wool] is becoming far less tolerable as a growing proportion of our wool is produced on improved pastures. More intensive operations on improved pastures involve a high ratio of cash to total costs."[13] It is difficult to assess the validity of this contention unless we specify more precisely what we mean by "becoming less tolerable". In a somewhat similar context W. Herbert Brown has given three possible meanings to the concept of increased vulnerability of farmers to a price-cost squeeze.[14] We may mean that as a result of pasture improvement, wool price fluctuations lead to (a) larger absolute fluctuations in farm incomes, or (b) larger percentage fluctuations, or (c) a lower absolute level of farm incomes when wool prices decline. As is shown in Appendix I —when farm income is defined as gross receipts minus cash costs— it is only in sense (a) that pasture improvement will definitely lead to greater vulnerability. Judging from our limited knowledge of the relevant costs and returns, it would appear that pasture improvement has relatively little effect on vulnerability in sense (b) and is likely to make farmers less rather than more vulnerable in sense (c).

The second input effect consists of the change in factor substitution relationships as a result of pasture improvement. By raising output per acre, pasture improvement saves land per unit of output. It raises total capital requirements absolutely, though probably not per unit of output. It will certainly raise the amount of capital required per unit of product relative to the amount of land. Whilst a pasture improvement programme involves the operator in additional work sowing pastures, controlling more stock and possibly

13. *The Australian Financial Review*, July 23rd, 1959, p. 33.
14. "Are Farmers more vulnerable to the Price-Cost Squeeze?" by W. Herbert Brown, *Journal of Farm Economics*, vol. XLI, no. 3, August 1959, p. 558.

taking extra measures against disease, many farmers have been able to cope with the extra work load without increasing their labour force.[15]

We would therefore expect pasture improvement to be mainly a land-saving innovation; *i.e.* one which raises the marginal product of land more than that of either capital or labour—though the marginal products of both are probably also increased. If the relative prices of these three factors were determined by technical conditions in the grazing industry it would be possible to test this view against the available evidence. However, the rewards of both capital and labour will be determined by developments in the economy as a whole; they can therefore be regarded as given for any particular industry. The case of land is in a different category; here the grazing industry is the major user of the resource. We would therefore expect that pasture improvement, by making land more productive (*i.e.* raising its average and marginal product), will increase its price. According to one estimate, the price of land suitable for pasture improvement has increased by 220 per cent. between 1945-46 and 1953-54 compared with an increase of 160 per cent. in the value of grazing land unsuited to pasture improvement.[16]

The adjustment to this innovation at the farm level would then involve a more intensive use of capital and possibly of labour per acre of land, to restore the equilibrium conditions between wool-growing and the rest of the economy.

(iv) *Who benefits from pasture improvement?*

Direct benefits.

While the benefits of technical progress in any one field will, in time, percolate through the whole economy, some groups of producers or consumers may make larger short-run gains than others. In fact—though this often tends to be ignored—technical progress in one field may easily cause considerable losses to some producers or to the owners of certain specific resources.

In the case of pasture improvement, both gains and losses can be expected. Among the gains one can distinguish between capital and income gains. As shown in the last section, the innovation of pasture improvement makes one specific and scarce resource—suitable land—more productive and hence more valuable. One effect will therefore be a capital gain for those described in a shearer's song as "the owners of the acres". The second effect will be an income increase for those individual graziers who can and do adopt

15. According to information available from the Sheep Industry Survey of the Bureau of Agricultural Economics, there has been no expansion in the total labour force on survey farms in the high-rainfall and wheat-sheep zones between 1952-53 and 1955-56. During this period pasture improvement has markedly increased on the same farms, sheep numbers have risen by about 10 per cent., and wool output by a similar proportion.

16. "Rural Land Values", by H. G. Collins, *Quarterly Review of Agricultural Economics*, vol. VII, no. 4, October 1954, p. 157.

this new practice. However, when we are examining graziers as a group, allowance has to be made for the fact that their adoption of an output-increasing practice will affect the price of the product. Those graziers who would not, or could not, adopt this practice will suffer a relative income decline as output is increased and prices reduced. This decline has been masked by other changes over the period considered, but if we want to analyze the effect of this innovation on incomes we need to attempt to isolate the relevant change.

Whether graziers as a group benefit from the adoption of this innovation will therefore depend not only on the extra costs incurred and the volume of additional output, but also on the response of price to an expansion of production—in other words, the relevant elasticity of demand for wool. Table IV shows the minimum elasticity of demand for Australian wool needed, for woolgrowers as a group to "break even" after the introduction of pasture improvement (given a number of different assumptions about its productivity and costs).[17] If one regards an average additional product of 10 lbs. of wool per acre and an average extra annual cost of 30/- per acre as typical for Australia as a whole, an elasticity of demand of 2·5 is required for net incomes to be maintained (when the net price graziers obtain for their wool is 5/- a lb.). If the long-run elasticity is below this level, woolgrowers as a group will have lower incomes after the intro-

17. The relevant formula can be derived from the standard marginal revenue formula found in most text-books.

(1) $dR/dX = p(1 + 1/E_a)$
where R is revenue, X output, p price and E_a equals $p.dX/X.dp$ or the elasticity of demand.

(2) $E_a = p.dX/dR-pdX$
where—in our case—dR equals the increase in total revenue necessary to offset extra costs of pasture improvement, and dX is the extra output resulting from pasture improvement.

As in all calculations involving point elasticities, the formula is only correct for infinitesimal changes. In an unpublished proof A. G. Powell has shown that if one defines E_a*—the Australian arc elasticity of demand—as $p_o\Delta X/X_o\Delta p$ (where the subscripts denote the period prior to the change) and r as the fractional increase in output we get the following formula:

(3) $E_a^* = p_o\Delta X(1+r)/\Delta R-p_o\Delta X$
However, as shown by R. G. D. Allen ("The Concept of Arc Elasticity of Demand", *Review of Economic Studies*, I, 1934, pp. 226-229), this formulation of arc elasticity has considerable theoretical difficulties which make it preferable to use point elasticities.

If one allows for the effects of a technical change on world real incomes and for the supply reaction to a lower wool price one can derive the following formula:

(4) $$\frac{dR}{di} = p\left[1 + \frac{(1+g_A)\left(1-\frac{X_A}{X_w}C_A\right)}{E_A-g_A+C_A}\right]$$

where g_A = Australian elasticity of supply of wool
C_A = marginal propensity to consume Australian wool
i = amount of pasture improvement.

The derivation of this formula is given in Appendix II where it is also shown that this reformulation does not affect the validity of (1) for the present purpose.

duction of pasture improvement than before; if demand is more elastic, woolgrowers' incomes will be higher.

TABLE IV

Minimum Elasticities of Demand for Australian Wool needed to "break even" after Introduction of Pasture Improvement

(Price of wool taken at 5/- per lb.)

Additional annual cost per acre	Additional product per acre (annual)		
	5 lbs.	10 lbs.	15 lbs.
18/-	3·5	1·6	1·3
30/-	*	2·5†	1·7
60/-	*	*	5·0

* These combinations would be unprofitable for the individual grower, hence the elasticity would need to be positive.

† If the price of wool is taken at 4/- per lb. the necessary minimum elasticity becomes 4·0, and if it is taken at 6/- it becomes 2·0.

It should perhaps be pointed out that the elasticity of demand referred to is the elasticity of demand for *Australian* wool (E_a) which is a function of (i) the world elasticity of demand for wool (E_w), (ii) the proportion of the world's wool supplied by Australia X_A/X_W where X_W is world consumption of wool and X_A is the quantity supplied by Australia and (iii) the elasticity of supply in other wool-producing countries (g_o). The relevant formula—first derived by Theodore Yntema—is as follows:

$$E_a = \frac{X_W E_W - (X_W - X_A) g_o}{X_A}.$$ [18]

We do not know the long-term elasticity of demand for Australian wool and it seems doubtful whether it can be estimated statistically at present because wool textile industries are changing markedly. Hence we cannot expect the processor's indifference map to be well defined and unchanged over time as statistical demand analysis requires. Horner has estimated that the pre-war long-run elasticity of demand for Australian wool was around 2·15.[19] It is true that this estimate is no longer of practical significance because of changed technical conditions. The advent of non-cellulosic synthetic fibres such as Terylene and Orlon since World War II, and the growth of blending in the wool textile industry, have no doubt tended to raise the world elasticity of demand (E_W) above the pre-war level.[20] On the other hand, it should not be assumed that these developments

18. Theodore O. Yntema, *A Mathematical Reformulation of the General Theory of International Trade*, Chicago, University of Chicago Press, 1932, ch. IV.

19. *Review of Economics and Statistics*, vol. 34, November 1952, p. 335.

20. "Raise" in this context means "made more elastic"—it seems to be common practice and considerably less confusing to ignore the negative sign. This is sometimes done by defining the elasticity as —p.dX/dp.X.

have made the demand for wool infinitely elastic. The different synthetic fibres and wool have their own distinctive qualities, and cannot be regarded as complete substitutes. It is possible that the textile research undertaken by both wool and synthetic fibre interests will gradually make these products more complete substitutes. This would increase the world's elasticity of demand for wool and thus make it relatively more profitable for Australia to expand the output of wool. But at present wool and synthetics remain very distinct commodities.

More recent econometric work suggests that the use of prices for single years (as in Horner's study) tends to under-estimate the true long-term elasticity, and that the introduction of lagged prices as variables usually results in the estimation of higher elasticities.

On the other hand, Australia now produces a larger proportion of the world's wool, and this would tend to reduce the elasticity of demand for Australian wool. If Australia's current contribution to the western world's wool supplies is substituted in Horner's equation (*i.e.* leaving E_W and g_o unchanged at the values used by Horner) E_a is reduced from 2·15 to approximately 1·65. If we accept Horner's assumption of an overseas elasticity of supply of around 0·2, E_W would need to rise from Horner's estimated pre-war level of between 0·4 and 0·5 to about 0·75 to give an elasticity of demand for Australian wool of 2·5.[21]

It can then by no means be taken for granted that Australian net income—or that of woolgrowers as a group—has been raised by pasture improvement. If woolgrowers as a group have gained some share of the rise in real product resulting from pasture improvement, it seems probable that a large proportion of the direct gain has been passed on in the form of lower prices to processors and consumers. Thus if the Australian elasticity is 4·0 and our other postulated "typical conditions" hold (*i.e.* 10 lbs. of wool per acre, cost 30 shillings, and the net price 5/- per lb.), 62½ per cent of the direct gains have been passed on to processors and consumers, and the remaining 37½ per cent. have accrued to woolgrowers.

Indirect benefits.

In addition, pasture improvement has produced certain important indirect benefits which should not be neglected even though they would be very difficult to measure.

(i) In the present state of the Australian economy, where many export or import replacing industries are receiving some form of

21. Horner's estimate of E_W has received some partial confirmation from a French study which suggests that the elasticity of demand for raw wool in the French textile industry was probably between 0·33 and 0·5 between 1946 and 1952. (The use of non-cellulosic synthetics was relatively unimportant prior to 1952.) Cf. Michel Verhulst and Claude Fourgeaud, 'Determination du volume du chiffre d'affaires et de la demande de laine en France de 1946 à 1952', *L'industria*, no. 2, 1955. I am indebted to Mr. M. Weisser for a summarized translation of this paper.

subsidy, the extra foreign exchange earned from increased wool exports is presumably worth more than the value placed on it in the market. The expansion of pasture improvement has therefore meant that we have been able to buy more abroad—at a lower real price—than would have been possible otherwise. Or put another way, import restrictions have been less severe in the last seven years than in the absence of this investment.

(ii) By raising the level of soil fertility on many farms previously restricted to wool production, pasture improvement has added to the flexibility of the farm sector of the economy. While a drastic decline of wool prices would still spell great hardship for producers on improved country, the new possibilities—fattening lambs or beef cattle, dairying, and possibly coarse grains, could become important alternatives which were previously ruled out by the infertility of the land.

(iii) In the pre-improvement stage most farmers in the wheat/sheep and high rainfall zones were following an exploitative form of land use which would gradually have led to declining production per acre. Because of the gradual nature of the decline—and because it is masked by great seasonal variability—it has not been possible to take this factor into account in the estimates used above. Soil conservationists are not able to tell us how soon production would have declined (in parts of the wheat/sheep zone it was evident in the 'thirties', or by how much, and whether it would have stabilized permanently at a new lower level. But there seems to be little doubt that some long-term decline in productivity could have been expected from the previous pattern of land use.

Conclusion

While the data at our disposal are too meagre to allow of any definite quantitative conclusions, they do throw some doubt on the widely-held view that an expansion in wool production as a result of pasture improvement is of direct economic benefit to wool producers as a group and to the Australian economy.

Furthermore, the discussion raises certain broader questions of policy which deserve some additional comment. It is frequently suggested that the right policy for the wool industry and for Australia to follow is to maintain or increase our rate of growth of wool production. The arguments advanced in support of this view fall into two categories:

(i) It is contended that a steady growth of export earnings is essential for our continuing economic development. The export prospects for many of the other traditional farm exports are threatened by marketing difficulties. In the case of wool, it is said, we have always managed to dispose of the whole of our clip without any significant carry-over from one selling season to the next.

But the absence of "marketing difficulties" is simply the result of the traditional method of marketing wool as compared with, say,

wheat. While this is one important advantage of the current system of wool marketing, it should not blind us to the effect of an increased supply on price. The proportion of the market supplied by Australia is such that our actions cannot but affect the prices obtained. It is probably true that the growth of wool production which would result from additional pasture improvement at this stage is still a relatively cheap and efficient method of obtaining extra foreign exchange. But the margin is not great, and the danger signals are fairly clear—if the wool price fell back to average 1958-59 levels of around 4/- a lb., and our proportion of apparel wool output rose further, from the present 37 per cent. to say 42 per cent.—this would probably become an expensive method of obtaining foreign exchange. Expensive in this sense means that pasture improvement, viewed as a national investment, would then return a negative yield (ignoring the indirect benefits mentioned above). Even this could, of course, be an advisable policy; depending on the costs of alternative methods of stimulating the exports of other products and/or replacing imports by home production in certain fields.

(ii) It is argued that "the best defence for wool against synthetic fibres is to produce more wool and in this way to put synthetic producers on the defensive, on the grounds that they have more to fear from falling prices than wool producers do. Moreover, a plenitude of wool is likely to lower the incentive for further research into new fibres."[22]

While we know very little about the prime costs of producing synthetics, this argument probably has considerable merit. High wool prices provide synthetics manufacturers with an incentive to expand plant capacity and to undertake further research. On the other hand, the argument can be pushed too far—at some level of prices the marginal costs of expanding wool output will outweigh any conceivable long-range benefits which a slower growth of synthetics production can yield to woolgrowers or to major wool exporters like Australia. As shown in a footnote to Table IV, the minimum elasticity of demand needed to "break even" rises steeply as prices decline. Before we could make any useful judgment about the optimum level of wool prices to aim at, we would need to know a lot more about the supply reactions of synthetics manufacturers. But the basic trend of the argument is clear—there is an optimum level of wool prices from the Australian point of view, and this depends on our marginal costs as well as those of the producers of synthetics. This is merely another way of stating the obvious point that competitors in an "industry" have common interests as well as divergent ones!

Lastly, reference should be made to one important facet of pasture improvement which has a bearing on our considerations but which has not been mentioned so far. The production responses to pasture improvement obtained under farm conditions are consider-

22. "Wool in the New Zealand Economy", by B. P. Philpott, *The Economic Record*, August 1957, p. 225.

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ably lower than those one would expect on the basis of experimental evidence. It is, of course, never possible to duplicate the care and attention devoted to experimental plots on a broad acre basis. One does, however, obtain the impression that the discrepancy between the experimental and the farm response is much greater than one would expect. If, as a result of applied research, something could be done to reduce this gap, the profitability of pasture improvement as a national investment might be greatly increased.

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APPENDIX I

The effect of wool price fluctuations on farm income before and after pasture improvement

To simplify the argument it will be assumed that (1) the farms considered produce only one product—wool; (2) the prices of purchased inputs and the quantities bought remain constant while wool prices fluctuate; (3) there are only two situations—wool production on "unimproved" or "improved" country.

The concept of farm income regarded as relevant in this context is gross receipts minus cost of purchased current inputs (*i.e.* total cash costs).

Notation:

Y = Farm income in period 0
Y_u = Farm income on unimproved farm
Y_i = Farm income on improved farm
Y' = Farm income after price change (*i.e.* in period 1)
p = Price of wool in period 0
Δp = Change in price
p' = Price of wool in period 1 (*i.e.* $p' = p + \Delta p$)
C = Total annual cash cost before pasture improvement
ΔC = Increase in annual cash cost after pasture improvement
X = Wool production before pasture improvement
ΔX = Increase in wool production after pasture improvement

$$Y_u = Xp - C$$
$$Y'_u = X(p + \Delta p) - C$$
$$Y_i = (X + \Delta X)p - (C + \Delta C)$$
$$Y_i' = (X + \Delta X)(p + \Delta p) - (C + \Delta C)$$

(a) *Change in actual income on the two farms after a price drop* ($\Delta p < 0$)

$$Y'_u - Y_u = X.\Delta p$$
$$Y'_i - Y_i = X.\Delta p + \Delta X.\Delta p$$

As $\Delta p < 0$ and $\Delta X > 0$ $\quad Y'_u - Y_u > Y'_i - Y_i$

The actual reduction in farm income on the improved farm will exceed the reduction on the unimproved farm (by the increase in output multiplied by the reduction in price).

(b) *Percentage income change on the two farms after a price drop.*

$$\frac{Y'_u - Y_u}{Y_u} = \frac{X.\Delta p}{X\,p - C} \qquad \frac{Y'_1 - Y_1}{Y_1} = \frac{X.\Delta p + \Delta X.\Delta p}{(X + \Delta X)\,p - (C + \Delta C)}$$

The percentage decline of income on the improved farm will be greater if

$$\frac{X.\Delta p}{X\,p - C} > \frac{X.\Delta p + \Delta X.\Delta p}{(X + \Delta X)\,p - (C + \Delta C)}$$

After simplifying

$$-\Delta C.\Delta p\,X > -C.\Delta p.\Delta X \quad \text{where } \Delta p < 0$$

$$\therefore \frac{\Delta C}{C} > \frac{\Delta X}{X}$$

i.e. the percentage increase in output (after pasture improvement) is smaller than the percentage increase in cash costs—or in other words when cash costs per unit of output rise the percentage decline of income on the improved farm will be greater.

Most published financial analyses of pasture improvement have used the partial budget approach which does not provide a basis for estimating the percentage increase in annual cash costs incurred. An examination of some unpublished B.A.E. sheep survey data suggests that the percentage increase in cash costs resulting from pasture improvement is probably not significantly greater than the percentage increase in output. This comparison is based on two groups of 12 farms each in the high rainfall zone of N.S.W. 62% of the total farm area in Group I was improved compared with 0·7% of the total farm area in Group II. Cash costs amounted to 44% of gross returns for Group I as compared with 40% for Group II. However, the farmers in Group I were still expanding their improved pasture acreage which would have added to current cash costs (*e.g.* pasture seed and fertilizer) whilst output (and gross returns) had not yet stabilized. In view of the small gap in cash costs per £ of gross return between the two groups, it seems doubtful whether cash costs per unit of output will have increased when the improvement programmes are completed.

(c) *Comparison of the absolute level of farm incomes when wool prices decline.*

i.e. Conditions when $Y'_1 - Y'_u > 0$

$$(X + \Delta X)\,(p + \Delta p) - (C + \Delta C) - X(p + \Delta p) + C > 0$$

$$\Delta X(p + \Delta p) - \Delta C > 0$$

$$\Delta X\,p' > \Delta C$$

Farm incomes on improved properties will exceed those on unimproved properties as long as the value of the increased output (at the new, lower, wool price p′) exceeds the increase in cash costs.

If the increase in cash costs should exceed the value of the additional output, farmers can probably reduce cash costs by cutting down on fertilizer purchases and other pasture maintenance expenses and gradually reducing the volume of output. The only cases where such a cost reduction is not possible are:

(i) where farmers have incurred substantial debts in the establishment of pastures and are paying interest on money borrowed. It is generally accepted that most capital expenditure on pasture improvement since the war has been financed out of income rather than by borrowing;

(ii) if reductions in cash costs after improvement led to a greater decline in output than the original increase. This seems unlikely to be of practical importance, though it may be applicable in the case of disease control and/or where the native pasture species have been completely replaced.

Appendix II

The effect of pasture improvement in the Australian wool industry on Australian incomes.

(1) $R_A = R_W - R_O$

where R = Revenue from sale of wool and subscripts A, W and O refer to Australian, World and Non-Australian magnitudes respectively.

(2) $\frac{dR_A}{di} = \frac{dR_W}{di} - \frac{dR_O}{di}$

where i = pasture improvement—one unit of pasture improvement being defined as that amount which yields a unit increase in wool output (*i.e.* approximately 1/10th acre of pasture improvement).

(3) $R_W = X_W p$

(4) $R_O = X_O p$

where X_W = world wool production

X_O = non-Australian wool production

p = relative price for wool

i.e. $\frac{\text{price of wool}}{\text{price of commodity ''E''}}$ where there are only two goods—wool and ''E''—and the price of ''E'' is taken as unity.

(5) $\frac{dR_W}{di} = p\frac{dX_W}{di} + X_W\frac{dp}{di}$

(6) $\frac{dR_O}{di} = p\frac{dX_O}{di} + X_O\frac{dp}{di}$

(7) $X_w = f(p,y)$

where X_w = demand for wool

y = world real income

(*i.e.* world money income—Y—divided by price of "E").

(8) $$\frac{dX_w}{di} = \frac{\partial X_w}{\partial p} \cdot \frac{dp}{di} + \frac{\partial X_w}{\partial y} \cdot \frac{dy}{di}$$

(9) $S_w = g(p,i)$ where S_w = world supply of wool = X_w

(10) $$\frac{dS_w}{di} = \frac{\partial S_w}{\partial p} \cdot \frac{dp}{di} + \frac{\partial S_w}{\partial i}$$

As i is measured in such units as will yield a unit increase in wool output

$$\frac{\partial S_w}{\partial i} = 1.$$

(10) then becomes (11) $$\frac{dS_w}{di} = \frac{\partial S_w}{\partial p} \cdot \frac{dp}{di} + 1.$$

(12) $Y \equiv X_w p_w + X_E p_E$

where Y = world money income.

p_w = price of wool

X_E = world production of "E"

p_E = price of "E".

(13) $$\frac{Y}{p_E} = y = X_w p + X_E$$

An increase in y resulting from pasture improvement will therefore be

(14) $dy = dp.\, X_w + p dX_w + dX_E + p di$

But $$\frac{dX_E}{dX_w} = -\frac{p_w}{p_E} = -p \text{ or } dX_E + p dX_w = 0$$

This represents a supply shift at the no-profit-no-loss margin; hence does not affect real income.

(14) therefore becomes

(15) $$\frac{dy}{di} = X_w \frac{dp}{di} + p$$

Subtracting (11) from (8) we get

(16) $$\frac{dp}{di}\left(\frac{\partial X_w}{\partial p} - \frac{\partial S_w}{\partial p}\right) + \frac{\partial X_w}{\partial y} \cdot \frac{dy}{di} - 1 = 0$$

Substituting (15)

$$\frac{dp}{di}\left(\frac{\partial X_w}{\partial p} - \frac{\partial S_w}{\partial p} + X_w \frac{\partial X_w}{\partial y}\right) = 1 - p\frac{\partial X_w}{\partial y}$$

Transforming into elasticities,

(17) $$\frac{X_w}{p.}\frac{dp}{di}(E_w - g_w + C_w) = 1 - C_w$$

where $E_w = \frac{\partial X_w}{\partial p} \cdot \frac{p}{X_w}$ = world elasticity of demand for wool

$g_w = \frac{\partial S_w}{\partial p} \cdot \frac{p}{X_w}$ = world elasticity of supply for wool

$C_w = p\frac{\partial X_w}{\partial y}$ = marginal propensity to consume wool.

$$(18)\quad \frac{dp}{di} = \frac{p(1-C_w)}{X_w(E_w - g_w + C_w)}$$

Substituting (18) and (11) in (5)

$$\frac{dR_w}{di} = p\left[1 + \frac{\partial S_w}{\partial p} \cdot \frac{p(1-C_w)}{X_w(E_w - g_w + C_w)}\right] + \frac{p(1-C_w)}{E_w - g_w + C_w}$$

$$(19)\quad \frac{dR_w}{di} = p\left[1 + \frac{(1+g_w)(1-C_w)}{E_w - g_w + C_w}\right]$$

$$(20)\quad S_o = g(p)$$

where S_o = supply of non-Australian wool = X_o

$$(21)\quad \frac{dS_o}{di} = \frac{\partial S_o}{\partial p} \cdot \frac{dp}{di}$$

Substituting (18) and (21) in (6)

$$\frac{dR_o}{di} = p.\frac{\partial S_o}{\partial p} \cdot \frac{p(1-C_w)}{X_w(E_w - g_w + C_w)} + \frac{X_o}{X_w} \cdot \frac{p(1-C_w)}{E_w - g_w + C_w}$$

$$(22)\quad \frac{dR_o}{di} = p.\frac{X_o}{X_w} \cdot \frac{(1+g_o)(1-C_w)}{E_w - g_w + C_w}$$

where $g_o = \frac{\partial S_o}{\partial p} \cdot \frac{p}{X_o}$ = elasticity of supply of non-Australian wool.

$$= \frac{X_w g_w - X_A g_A}{X_o}$$

where $g_A = \frac{\partial S_A}{\partial p} \cdot \frac{p}{X_A}$ = elasticity of supply of Australian wool.

$$\therefore\ (23)\quad \frac{dR_o}{di} = p\,\frac{\left(\frac{X_o}{X_w} + g_w - \frac{X_A}{X_w} g_A\right)(1-C_w)}{E_w - g_w - C_w}$$

Subtracting (23) from (19)

$$\frac{dR_w}{di} - \frac{dR_o}{di} = p\left[1 + \frac{(1-C_w)\left(1 - \frac{X_o}{X_w} + g_w - g_w + \frac{X_A}{X_w} g_A\right)}{E_w - g_w - C_w}\right]$$

$$= \frac{dR_A}{di}$$

$$(24)\quad \frac{dR_A}{di} = p\left[1 + \frac{X_A(1+g_A)\ (1-C_w)}{X_w(E_w - g_w + C_w}\right]$$

This can be converted into Australian elasticities by substituting

$$E_w = \frac{X_A E_A + X_o g_o}{X_w}$$

$$g_W = \frac{X_A g_A + X_O g_O}{X_W}$$

$$C_W = \frac{X_A}{X_W} C_A$$

(24) then becomes

$$\frac{dR_A}{di} = p\left[1 + \frac{X_A(1+g_A)\left(1-\frac{X_A}{X_W}C_A\right)}{X_W\left(\frac{X_A E_A + X_O g_O - X_A g_A - X_O g_O + X_A C_A}{X_W}\right)}\right]$$

$$(25)\quad \frac{dR_A}{di} = p\left[1 + \frac{(1+g_A)\left(1-\frac{X_A}{X_W}C_A\right)}{E_A - g_A + C_A}\right]$$

(25) differs from formula (1) in footnote (17), *i.e.* $\frac{dR}{dX} = p\left(1+\frac{1}{E_A}\right)$ by the inclusion of the Australian elasticity of supply of wool (g_A) and the marginal propensity to consume Australian wool (C_A).

In the context of our enquiry—an assessment of the effect of pasture improvement on Australian incomes—g_A can probably be ignored, for this represents mainly a supply shift to other products in response to the drop in wool price. As such it does not affect the change in the *amount* of Australian income as a result of pasture improvement. While supply shifts will affect the incomes of woolgrowers as producers of wool, this will be offset by their increased incomes from beef, fat lambs, wheat, dairying, etc. As all these commodities are exported, the effects of supply shifts on export incomes can also be ignored—especially as the Australian share of the world market for these products is considerably smaller than in the case of wool.

The second new term in (25)—namely C_A—the increase in consumption of Australian wool resulting from the rise in world real income when there is an expansion of pasture improvement in Australia, is likely to be very small ($< \cdot 001$) and can safely be ignored for practical purposes.

Under competitive conditions, investment in pasture improvement will be carried to the point where marginal cost = price times marginal product or $dC = pdi$ in our notation. The burden of the argument is that Australian incomes will not, however, be maximized then; instead, they will be maximized when

$$(26)\quad dC = dR_A = pdi\left[1 + \frac{1-\frac{X_A}{X_W}C_A}{E_A + C_A}\right]$$

where $\frac{1-\frac{X_A}{X_W}C_A}{E_A + C_A}$ is certainly negative.

Hence investment in pasture improvement (in the Australian wool industry) should not be carried to the point of competitive equilibrium.

MOVEMENTS IN TASMANIA'S "INTERNATIONAL RESERVES"

1952–53 to 1956–57*

1. *Introduction*

As is well known, the capital account section of a national balance of payments estimate always contains an item bearing some such title as "Net Increase in International Reserves". In the case of an estimate for an area which is merely part of a national unit (e.g. an Australian state) this item will not appear since such an area possesses nothing corresponding to the foreign currency reserves of the nation to which it belongs. Nevertheless in such a case the capital account section must contain an item which plays the same role as that played by the "International Reserves" item in a national estimate, i.e. which reflects the net result of all the financial transactions taking place between the area in question and the outside world over the period of time to which the estimate relates. This item might well be termed "Net Money Payments". The object of the present paper is to set out estimates of this item for Tasmania for the years 1952-53 to 1956-57[1] and to explain and justify the method used to make them—a method which is widely applicable and likely, therefore, to be of general interest. We shall begin by dealing with the method and then proceed to set out the figures themselves.

2. *The Method*

(a) *Explanation*

The method is a very simple one. To estimate the Net Money Payments made to Tasmania in any year we added:

(i) the increase over the year in the value of notes and coin in circulation in Tasmania; and

(ii) the increase over the year in current deposits held in Tasmania (excluding the Commonwealth Government's deposits), less the increase in trading-bank advances made in Tasmania.

(b) *Justification*

The method of estimating Net Money Payments to Tasmania just outlined can be justified in either of two ways which we shall refer to, respectively, as "the stock approach" and "the flows approach".

* I should like to express my thanks to Dr. D. Badger of the Commonwealth Bank and Mr. M. Summers, formerly of the Balance of Payments Division of the Commonwealth Bureau of Census and Statistics and now of the staff of the Tariff Board, for extremely valuable comments on an earlier draft.

1. These estimates are to form part of complete balance of payments estimates for the State.

(i) *The Stock Approach*

Suppose that on, say, 30th June, 1959, Tasmania were to introduce its own monetary unit. The stock of oversea currency held by Tasmanian residents on this date would then become Tasmania's foreign currency reserves. This stock would consist of two elements. The first would be the oversea notes and coin (including Australian notes and coin) actually held by Tasmanian residents and the second would be such of their claims to oversea notes and coin as were payable on demand. The latter would, in turn, be equivalent to the net deposits[2] of Tasmanian residents with non-resident banks. Thus if we wished to estimate Tasmania's foreign currency reserves as at the date on which the Tasmanian pound was introduced, we would need to determine (a) the value of oversea notes and coin held by Tasmanian residents on that date and (b) the net deposits held by them with non-resident banks.

Take the second of these items first. We could greatly simplify our task of determining the net deposits held by Tasmanian residents with non-resident banks by making three assumptions, none of which would represent a serious departure from reality. These assumptions are: (a) that the entire Tasmanian banking system is non-resident;[3] (b) that no Tasmanian resident holds a deposit outside Tasmania; and (c) that the Commonwealth Government is the only foreign (i.e. non-Tasmanian) resident which holds a deposit inside Tasmania. Having made these assumptions we could clearly determine the net deposits held by Tasmanian residents with non-resident banks simply by finding the total net deposits held in Tasmania and excluding the deposit held by the Commonwealth Government with the Central Bank in Tasmania.

Turning to the first item—the value of oversea notes and coin held by Tasmanian residents—we could safely assume that Tasmanian residents hold no oversea notes and coin other than Australian. With this assumption we could then determine the first item simply by finding the total value of Australian notes and coin in circulation in Tasmania on 30/6/59 and deducting the portion of this total held by foreign residents.[4]

Given our assumptions, then, we could estimate Tasmania's foreign currency reserves, as at the date on which the Tasmanian pound was introduced, from:

(a) Total net deposits held in Tasmania excluding net deposits of Commonwealth Government with Central Bank in Tasmania

2. By "net deposits" we mean current or demand deposits held either with trading or savings banks, less trading bank advances. We shall use the words in this sense throughout.

3. For a discussion of the distinction between resident and non-resident institutions see *Balance of Payments Manual*, International Monetary Fund, 1950, p. 2.

4. The only foreign residents of any consequence would be the Commonwealth Government and the banks.

plus

(b) Value of Australian notes and coin in circulation in Tasmania

less

(c) Non-resident holdings of Australian notes and coin in Tasmania.

Further, if we denote the above three items as at 30/6/60 (i.e. one year after the introduction of the Tasmanian pound) by a', b' and c' we could estimate the *increase* in Tasmania's foreign currency reserves over the first year of the new monetary arrangements from:

$$(a' + b' - c') - (a + b - c) = (a' - a) + (b' - b) - (c' - c)$$

or, in full, from:

(d) Increase in net deposits held in Tasmania, excluding increase in net deposits of Commonwealth Government with Central Bank in Tasmania

plus

(e) Increase in value of Australian notes and coin in circulation in Tasmania

less

(f) Increase in non-resident holdings of Australian notes and coin in Tasmania.

We would probably not go far wrong if we assumed item (f) to be zero[5] in which case we would finish up with the sum of items (d) and (e) as our estimate of the increase in Tasmania's reserves of foreign currency over the first year of the new monetary arrangement.

Now, as we saw in the introductory paragraphs, the item we wish to estimate (Net Money Payments to Tasmania) plays the same role in the Tasmanian capital account as the item "Increase in Reserves of Foreign Currency" in a national capital account. This being so, the arithmetic which would enable us to estimate the increase in Tasmania's reserves of foreign currency if she were to introduce her own monetary unit and so become a separate nation for balance of payments purposes, ought also to give us an estimate of the net money payments made to Tasmania in a period in which she uses the Australian monetary unit. This means, however, that we should be able to estimate Net Money Payments to Tasmania by summing items (d) and (e) above, which in fact is what we have done.

(ii) *The Flows Approach*

The starting point of the flows approach is a catalogue of the various possible ways in which a non-Tasmanian resident can make a payment to a Tasmanian resident. This we shall now present.

One way in which a non-resident can make a payment to a resident is by increasing the value of the notes and coin in circulation in

5. This would amount to assuming no change in the till money held by the Commonwealth Government in Tasmania and by the Tasmanian banking system. (See preceding footnote.)

Tasmania. This type of payment occurs when a foreign traveller arrives in Tasmania with a stock of notes and coin which he spends during his stay or when a foreign resident sends currency to a Tasmanian resident through the post.

A second way in which a non-Tasmanian resident can make a payment to a Tasmanian resident is by transferring currency which he or some other non-Tasmanian resident holds in Tasmania, to that Tasmanian resident. This type of payment occurs, for example, whenever the Commonwealth Government makes a currency payment to a Tasmanian resident in relation, say, to child endowment. It occurs also whenever a Tasmanian resident cashes a postal note or money order, sent to him by a foreign resident, over a post office counter in Tasmania. Here the foreign resident making the payment has arranged for another foreign resident (i.e. the Commonwealth Government) to transfer currency which the latter holds in Tasmania to the Tasmanian resident concerned.

Finally, a non-resident can make a payment to a resident by increasing the net deposit which that resident holds in Tasmania.[6] This, no doubt, is the way in which most payments by foreign residents to Tasmanian residents are made. It is the method of payment used when, say, a Victorian resident sends a cheque to a Tasmanian resident which the latter pays either into his savings account or his cheque account; when a British firm, say, accepts a bill of exchange drawn on it by a Tasmanian exporting firm which the latter discounts with its bank in Tasmania; when a Tasmanian resident arranges for child endowment payments, say, to be made direct to his bank account rather than in currency, or pays a postal note or money order received from a Victorian resident into his bank account for collection rather than cashing it over the post-office counter.

There are, then, these three possible ways in which a payment can be made by a non-Tasmanian resident to a Tasmanian resident; and, of course, there are three corresponding ways in which a payment can be made in the reverse direction—by reducing the value of currency in circulation in Tasmania, by increasing the currency holdings of foreign residents in Tasmania and by reducing the net deposits held in Tasmania by Tasmanian residents.

The conclusion we reach from this catalogue is that an excess of payments to Tasmanian residents over payments by Tasmanian residents, during any given period of time, will appear as:

(a) An increase in the total net deposits held in Tasmania, excluding those of the Commonwealth Government;[7] and/or

(b) An increase in the value of currency in circulation in Tasmania; and/or

6. It must be "in Tasmania" because we are assuming, as in the stock approach, that no Tasmanian resident holds a bank account outside Tasmania.

7. We continue our assumption that the Commonwealth Government is the only non-resident holding a bank account in Tasmania.

(c) A decrease in foreign residents' holdings of currency in Tasmania.

Hence the item, Net Money Payments to Tasmania, must constitute part of the sum:

(d) Increase in net deposits held in Tasmania excluding those of the Commonwealth Government

plus

(e) Increase in value of notes and coin in circulation in Tasmania

less

(f) Increase in foreign residents' holdings of notes and coin in Tasmania.

Moreover, it must constitute *the only* part, since any payment between one Tasmanian resident and another must leave this sum unaffected.[8] For example, a between-resident payment by cheque will increase and decrease (d) by the same amount and, therefore, have no effect on (d) + (e) — (f). Again, a between-resident payment which takes the form of a transfer of currency will have no effect on any one of (d), (e) and (f) and so none on (d) + (e) — (f). This being so, we can estimate Net Money Payments to Tasmania from (d) + (e) — (f); and if we assume, as before, that (f) is zero we are left with the sum of (d) and (e) as our estimate, just as in the stock approach.

3. *The Estimates*

As explained in section 2, the method we have used to estimate Net Money Payments to Tasmania calls for information about the increase in the value of notes and coin in circulation in Tasmania in various years and the increase in net deposits held in Tasmania, other than those of the Commonwealth Government. The latter information is available and we had merely to put it together. Information about changes in currency circulation in Tasmania is not available, however, and it was necessary to make an estimate. We shall begin by explaining how this estimate was made and we shall then present the available information about changes in net deposits. Finally, the two sets of figures will be brought together to give the estimates of Net Money Payments.

(a) *The Increase in Currency Circulation*

The net increase in currency circulation in Tasmania over any period of time will have four main components: (a) the net value of notes brought into Tasmania by the banking system over the period (i.e. the value of new notes brought in by the banks less the value of

8. It may be objected that while the sum will not be affected by between-resident transactions it will be affected by any net transfer of currency into Tasmania through the banking system—an action which is not a payment from a foreign to a Tasmanian resident. This objection, however, is not valid. To the extent that the new currency stays with the banks the increase in (e) will be offset by an equal increase in (f) (the entire banking system being treated as non-resident as in the stock approach), so that the sum is unaffected; while to the extent that it passes into the hands of Tasmanian customers of the banks the increase in (a) will be offset by a decrease in (d).

old notes sent out by them for destruction); (b) the net value of notes and coin brought into Tasmania by travellers over the period; (c) the net value of coin brought into Tasmania by the banking system over the period; and (d) the net value of notes sent into Tasmania through the post over the period.

For all practical purposes, the first two of these four items are the only ones that matter: whatever the sign of the last two, their magnitude is undoubtedly very small. Accordingly, in making our estimate, we did not go beyond items (a) and (b). Our procedure was to obtain figures for item (a) from the Hobart branch of the Commonwealth Trading Bank and to adjust them upwards very slightly to allow for the likelihood that travellers brought rather more currency into Tasmania than they took out during the years in which we are interested. The resulting estimate is set out in Table I below.

TABLE I

Estimated Increase in Value of Notes and Coin in Circulation, Tasmania, 1952–53 to 1956–57

(£'000)

(1) Year	(2) Estimated Increase in Value of Notes and Coin
1952–53	1,046
1953–54	1,982
1954–55	2,012
1955–56	1,278
1956–57	817

TABLE II

Current Deposits held with Trading and Savings Banks, Tasmania, End of Year, 1951–52 to 1956–57

(£'000)

Year	(1) Current Deposits held with Trading Banks at End of Year*			(2) Deposits held with Savings Banks at End of Year†	(3) (1) + (2)
	Not Bearing Interest	Bearing Interest	Total		
1951-52	23,697	732	24,429	30,119	54,548
1952-53	24,324	633	24,957	32,078	57,035
1953-54	27,375	717	28,092	33,947	62,039
1954-55	28,057	785	28,842	35,809	64,651
1955-56	29,559	917	30,476	37,211	67,687
1956-57	29,273	1,096	30,369	38,759	69,128

*At close of business on last Wednesday in June. Supplied by Commonwealth Bureau of Census and Statistics, Canberra.

†At close of business on 30th June. Figures taken from the Tasmanian *Monthly Review of Business Statistics*, published by the Tasmanian Office of the Commonwealth Bureau of Census and Statistics.

TABLE III

Trading Bank Advances Outstanding at End of Year, Tasmania, 1951–52 to 1956–57

(£'000)

Year	Advances Outstanding at End of Year*
1951-52	17,188
1952-53	16,996
1953-54	20,052
1954-55	21,587
1955-56	20,630
1956-57	20,116

* At close of business on last Wednesday in June. Supplied by Commonwealth Bureau of Census and Statistics, Canberra.

TABLE IV

Increase in Net Deposits (other than Commonwealth Government Deposits), Tasmania, 1952–53 to 1956–57

(£'000)

Year	(1) Increase in Current Deposits	(2) Increase in Advances	(3) Increase in Net Deposits, i.e. (1) — (2)
1952-53	2,487	—192	2,679
1953-54	5,004	3,056	1,948
1954-55	2,612	1,535	1,077
1955-56	3,036	—957	3,993
1956-57	1,441	—514	1,955

TABLE V

Net Money Payments to Tasmania from Outside World, 1952–53 to 1956–57

(£'000)

Year	(1) Column 2, Table I	(2) Column 3, Table IV	(3) Net Money Payments To Tasmania (1) + (2)
1952-53	1,046	2,679	3,725
1953-54	1,982	1,948	3,930
1954-55	2,012	1,077	3,089
1955-56	1,278	3,993	5,271
1956-57	817	1,955	2,772

(b) *The Increase in Net Deposits*

The increase in net deposits held in Tasmania, excluding those of the Commonwealth Government with the Central Bank, for each of the years 1952-53 to 1956-57 is shown in Table IV above. This table has been built up in an obvious way from Table II, which shows the deposits held in Tasmania at the end of 1951-52 and subsequent years, and Table III which shows the outstanding trading bank advances at the corresponding points of time.

(c) *Net Money Payments*

Our estimates of Net Money Payments to Tasmania are set out in Table V which has, of course, been built up from Table I and Table IV. It will be seen from this table that Tasmania added to her "international reserves" in each of the years 1952-53 to 1956-57. The complete balance of payments estimates for the State are expected to show that this increase in reserves was made possible by a capital inflow of sufficient strength to more than offset a substantial current account deficit.

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DR. CORDEN'S UNIFORM TARIFF PROPOSAL: A COMMENT

This comment was stimulated by Dr. W. M. Corden's article in the *Economic Record,* December 1958, "Import Restrictions and Tariffs: A New Look at Australian Policy". The main arguments of Dr. Corden's paper were that import restrictions should be replaced by tariffs, and that tariff rates should (with limited exceptions) be the same on all imports, as there are few good reasons for the tariff rate to be higher on one product than another. In addition, it was suggested that alterations in the exchange rate should be considered for long-term balance of payments difficulties. Messrs. G. G. Firth and A. J. Hagger in their article, "The Australian Economy, February, 1959" (the *Economic Record,* April 1959) questioned the advantages of the uniform tariff as suggested by Dr. Corden. The purpose of this comment is to point out certain basic disadvantages which the introduction of the uniform tariff as suggested by Dr. Corden would have in relation to our existing protective tariff system.

1. *The Proposals for a Uniform Tariff*

In Australia, the tariff system is used as a revenue and protective instrument and the system of import licensing as an equilibriating balance of payments instrument—to restrict the demand for foreign exchange to the available supply. It has been more and more evident in the recent years that the system of import licensing, which was originally introduced as an emergency short-run measure, has become more or less a long-term feature of our balance of payments policy and that as such it has certain fundamental disadvantages. As a result, several alternative measures have been suggested,[1] one of them being a uniform tariff.

The possibility that import licensing should be replaced by a uniform tariff has been discussed by Professor Karmel,[2] and Professor Arndt,[3] and mentioned by Lundberg and Hill.[4] Recently it was proposed by E. A. Russell[5] and forcefully advocated by W. M. Corden.[6]

1. See e.g. P. H. Karmel, *Economic Policy in Australia—Ends and Means,* G. L. Wood Memorial Lecture, 1954; H. W. Arndt, "Import Licensing—Are Objections Valid?" *Voice,* June 1955; E. Lundberg and M. Hill, "Australia's Long-Term Balance of Payments Problems", *Economic Record,* May 1956; J. E. Meade, "The Price Mechanism and the Australian Balance of Payments", *Economic Record,* November 1956; E. A. Russell, "Trade and Policies and Australia's Balance of Payments", *Business and Economic Policy* (Third Summer School of Business Administration, Adelaide, 1958); W. M. Corden, "Import Restrictions and Tariffs: A New Look at Australian Policy", *Economic Record,* December 1958; R. Mathews, "The Australian Economy, November 1958", *ibid.*; The Commonwealth Bank of Australia, *The Annual Report,* 1958.
2. P. H. Karmel, *op. cit.,* pp. 25, 26.
3. H. W. Arndt, *op. cit.,* p. 21.
4. E. Lundberg and M. Hill, *op. cit.,* p. 45.
5. E. A. Russell, *op. cit.,* p. 38.
6. W. M. Corden, *op. cit.*

Professor Karmel put forward the following argument for the use of tariffs for balance of payments purposes: "In the present circumstances a case can be made for some over-all lift in tariffs. It must be emphasized that the purpose of such a policy is to correct a disequilibrium in our balance of payments and not to secure cosy markets for inefficient Australian industries. For this reason the lift in the tariff should consist of the superimposing of a uniform ad valorem tariff. Whether or not to give particular industries special protection for special reasons is quite a separate question and is, of course, the proper province of the Tariff Board. At the same time a general increase in the tariff will raise internal prices. This is unavoidable under present circumstances. The practicability of the policy suggested here depends on our international commitments." (P. 26.)

E. A. Russell's proposal for a sufficient general increase in the tariff to allow the removal of import licensing was along similar lines. The essence of the argument was that we should replace a system of protection through import controls which varied widely from industry to industry by one that gave a standard advantage to Australian producers. As a result those industries best suited to Australian conditions and costs would flourish and expand and those that used resources wastefully would contract and be replaced by imports. The average annual level of imports would not be increased, but the structure of imports would be more in line with our needs. Once such a general increase in the tariff has been made, we could allow fluctuations in our international reserve to cope with year-to-year changes in our exports and imports or even re-impose direct controls to deal with an emergency. The proposal would still allow the Tariff Board to propose special protection for particular industries. In fact, only when the general balance of payments problem had been dealt with and import controls dismantled could the Tariff Board carry out efficiently its special functions. If the required increase is x%, goods now paying 20% will pay (20 + x)%; those paying 30% will pay (30 + x)%; goods now entering duty free will pay x%.

Professor Arndt discussed the idea of a uniform tariff in connection with the possibility of auctioning of licences—the effect of auctioning would be equivalent to the imposition of a uniform tariff on all imports. In his view there were two difficulties connected with a uniform tariff as opposed to auctioning. The first difficulty was that under various trade agreements concluded with other countries under GATT auspices, we have agreed not to raise tariff rates on a variety of products; any breach of this commitment would entitle other countries to withdraw reciprocal concessions to our exports. A way out of this difficulty would be to substitute for a uniform ad valorem tariff an equivalent increase in the selling rate for sterling and other foreign currencies charged by the Commonwealth Bank. This would avoid a formal breach of tariff agreements and would give other countries no more ground for retaliation than any other method of cutting down imports. The second difficulty was that though the ultimate effects of

the sale of licences and a uniform tariff are the same, there is a significant difference in the short-run. Import licensing enables the authorities to fix with certainty the permissible amount of foreign exchange to be spent and, under auctioning, leaves to the market merely the price level at which the restricted supply of foreign exchange (or imports) sells. A tariff (or increased price of foreign exchange) on the other hand, obliges the authorities to find and fix the price level at which demand for imports would fall to the necessary extent, a task in which precision can hardly be expected. But even this objection would not be too serious if action were taken early, while international reserves were still sufficient to allow a margin for error. (P. 21.)

Dr. Corden compared import licensing and the tariff system and put forward a powerful argument that (a) import restrictions should be replaced by tariffs and (b) tariff rates should (with limited exceptions) be the same on all imports, as there are few good reasons for the tariff to be higher on one product than another (p. 331).[7]

A closer comparison of the proposal of Dr. Corden with those of Professors Karmel and Arndt shows that there exists a substantial difference between them. From the contents of Dr. Corden's article it seems evident that part (b) of the argument related not only to the uniform tariff which would replace the existing import restrictions and which then would change according to the state of the balance of payments, but also to the existing tariff system.[8] Both the existing system of import licensing and the existing system of customs tariffs would be replaced by a uniform tariff with few exceptions upwards and downwards, and the whole new system would change along with the state of balance of payments and foreign exchange reserves.

This is a different argument from that of Professor Karmel and Mr. Russell who proposed a uniform tariff which would include two parts, the existing protective tariff schedule which would change along the lines of the existing procedure, i.e. after the investigation and report of the Tariff Board, plus a uniform tariff rate for all imports over and above the protective tariff rates, which would change with the state of the balance of payments. At a satisfactory level of foreign exchange reserves and balance of payments equilibrium the uniform tariff would disappear and the existing protective tariff schedule would be preserved. Dr. Corden on the other hand seems to envisage a uniform tariff rate for all imports as the basic tariff structure which would change with the state of the balance of payments plus certain marginal exceptions for protective purposes which would be justified by the investigations and reports of the Tariff Board.

7. For the precise policy recommendations see W. M. Corden, *op. cit.*, pp. 345, 346.

8. It may seem that in Section I, p. 332, point (5) and in Section II when Dr. Corden talks about a uniform tariff he means only the tariff which would replace import restrictions. However, it is evident that in Section III and Section V, when dealing with the first three steps of government policy, Dr. Corden definitely means a uniform tariff to replace both the existing tariff and import licensing system.

2. *Uniform Tariff versus the Existing Protective Tariff System*

It seems to the writer of this comment that the major difficulty connected with the uniform tariff of Dr. Corden would be its effect on the existing protective tariff system and through it on protected Australian industries.

The present Customs Tariff Schedule includes over 500 major items and several thousands of sub-items, a large number of which were introduced for protective purposes. Their incorporation into the Tariff Schedule was preceded by numerous public enquiries and investigations by the Tariff Board and discussions in the Federal Parliament which took into consideration both economic and non-economic factors. The protection was proposed by the Tariff Board and granted and maintained by the Federal Parliament in the belief that it was beneficial to the Australian community both on economic and non-economic grounds. The reorganization of the existing system of customs tariff and import licensing into a uniform tariff of Dr. Corden's type and the manipulation of protective tariff rates for balance of payments purposes would disrupt the present protective tariff system, destroy the whole work of the Tariff Board, and have an unsettling effect upon our protected manufacturing industries. The protective tariff rates of most industries would change and fluctuate with the state of the balance of payments and when the equilibrium was restored and international reserves were at a satisfactory level, the protective rates would, with few exceptions, disappear. This would not give much security and reasonable confidence to the manufacturers (investors) and labour in the industries which obtained protection in the past and made their long-run and short-run planning on its assumption. Protection in their calculations would become an unstable variable which would be a function of the balance of payments and not the function of reasonable needs of the industry in the scheme of the whole economy. This becomes evident when we compare the existing protective system and Dr. Corden's idea of protection.

Dr. Corden is basically a free trader. The only economic reasons for protection which he really accepts are certain margins over and above the uniform tariff rate. When there is reasonable external balance under his system the whole uniform tariff would disappear. These margins, and there would be only very few of them, include:

(a) the protection of infant industries and only when they promise external economies. Proof of internal economies—that costs will fall either with time or with increasing output—is no valid case for protection (p. 338);

(b) anti-dumping duties, if dumping is temporary and designed to kill home competition (p. 339).

His idea of protection sharply contrasts with our existing tariff practice. The government's policy is to provide adequate protection for "efficient and economic" local industries. This has been the policy

of successive Federal Governments for over a generation. The terms "efficient and economic" were never defined precisely and the interpretation was left to the Tariff Board and in the final instance to the Federal Parliament. It seems, however, that the term "efficient" related to the production cost (price) of the home industry in comparison with overseas competitors, and to the possibility that the home industry would reduce costs over time. The term "economic" related to the benefits, as compared with temporary costs, which the industry would have for the economy and the community.

It seems that it is still generally believed that the major benefit of the Australian tariff is that it stimulates the development of manufacturing industries which, in comparison with alternative expansion of primary industries, are the major vehicles for the absorption of an increasing population at a higher standard of living.[9] It is also believed that the tariff policy, by stimulating and protecting manufacturing industries, brought more stability into our national income and employment. In a country like Australia where primary products still provide almost 90% of our total export income there is a strong reason for this belief, as primary production is subjected to a great deal of instability from both the supply and demand side. The relative ease with which the economy absorbed the effects of the recent U.S. recession can be taken to support this view.

The need to increase exports of secondary industries is generally recognized and it is believed that the protection of the home market will stimulate the step from the Australian to the foreign markets. Mr. McEwen expressed this view in Parliament on 12th August, 1958, in a speech on a series of tariff proposals:

"I realize that secondary industry will, in general, only be able to go into the export business if it has a firm grip on the local market as a sound base from which to move in to the colder and more competitive world markets. This is where the tariff plays its part. The government will provide adequate protection for economic and efficient Australian industries in their home market. Industry can plan its production with this assurance."[10]

9. See e.g. The Government Public Relations Office, Parliament House, Canberra, *Speech by the Minister for Trade (Mr. J. McEwen) at the N.S.W. Chamber of Manufactures Annual Dinner, Sydney, 10th September, 1957*: "I am here as Minister for Trade concerned with the Department which deals with the policies affecting industry. What is our policy—what is the Government's overall policy? I can sum it up in two sentences—security of the country—prosperity of the country. These two things could conflict. They don't conflict in the case of secondary industry—they synchronize. For our security there is no greater factor than population. For big population there is no basis other than secondary industry. That statement is clear, unqualified and unalterable. So it is part of our high policy to expand secondary industry as a population carrying vehicle. This is not said to please you. It is basic in our thinking." (P. 2, 3.) See also *ibid., Inaugural Meeting of the Manufacturing Industries Advisory Council. Summary of Opening Address by the Minister for Trade (Mr. McEwan)*, July 22, 1958: "In the total development of the country, manufacturing industry had an enormously important role. It involved pressing ahead with plans for population increase and manufacturing industry was the principal vehicle for carrying population in the standard of living that Australians wanted." (P. 2.)

10. Department of Trade, *Overseas Trading*, September 19, 1958, p. 424.

Thus the protection given to a particular industry is not given for one motive alone, e.g. to protect an infant industry, but for several other reasons as well, e.g. promotion of population growth, promotion of a greater stability of national income and employment, protection of labour standards, etc. The reasons for protection are much broader than and different from those of Dr. Corden.

Dr. Corden argued (Section 1, point (5)), that a uniform tariff would automatically discriminate among imports in the desired way—it would select the right type of imports and protect the right type of industries. What he really says is that his uniform tariff would involve a free trade pattern of economic growth, both because of the protection given to industries in the form of tariff duties and because of the allocation of scarce currency in the case of balance of payments difficulties. His idea (based on the theory of comparative costs and its two limiting assumptions—the constant supply of factors of production and constant techniques of production) runs counter to the accepted idea that economic growth (or development) is a process which must be consciously shaped and regulated to suit the ideals and aspirations (political, economic, ethical, etc.), of a given society. In our Australian case it runs counter to the accepted idea that our policy of protection should promote a pattern of economic development which stimulates a rapid population growth at a higher standard of living, which increases the stability of our national income and employment, protects our wage standards, promotes the diversification of our export industries, etc. Dr. Corden could object that his proposal will achieve all these objectives at a lower economic cost. But he would have to prove it. In a world of guided welfare philosophy he will have a hard case. It would have been easier 100 years ago.

There are two further difficulties of a practical nature connected with the use of a uniform tariff for balance of payments purposes which Dr. Corden considered only briefly and which may be of greater importance than his article suggests.

The first difficulty relates to the determination of the rate of tariff changes. When we expect a deficit in the balance of payments and desire to restrict the value of imports to a certain level in order to protect our foreign reserves, by what percentage should the tariff be increased? Would Dr. Corden give some precise directions or prescriptions to guide the administrator of the uniform tariff when he asks him to use it for emergency balance of payments purposes or would he advise him to use practical judgement and determine the desired rate of tariff increase by trial and error? Because of a large number of import commodities involved and because of the problem of different elasticities, the result would be uncertain and the probable tendency on the side of the administrator to over-restrict the level of imports in order to minimize the danger of a decline of international reserves below a certain minimum level.

The second difficulty connected with the proposals to use tariff for balance of payments purposes relates to our "bound" duties under

GATT. The proposals of Professor Karmel, Mr. Russell and Dr. Corden would all involve an increase in the existing tariff rates.[11] It is quite possible that this change, which would effect the tariff concessions which we granted to different countries during the tariff bargaining at Geneva, Annecy and Torquay, would bring about a suspension of concessions granted to our exports from the affected countries. To avoid this possibility Dr. Corden suggested a renegotiation of our basic GATT agreements and, in the case of failure, exemptions for the bound duties.

The proportion of the bound duties in our tariff schedule is high. The Australian schedule annexed to the General Agreement in 1947 included almost 150 Tariff Items, many of them having a large number of sub-items[12] which were negotiated with the British Commonwealth countries, with the United States, the Benelux Customs Union, Czechoslovakia, France and French colonies, Brazil, Burma, Chile, Cuba, Norway and several other countries. The schedule of bound duties was further increased during the tariff negotiations at Annecy where we granted concessions on fifty-one tariff items to Denmark, Finland, Greece, Italy and Sweden. A further substantial increase occurred during the tariff negotiations at Torquay where our tariff rates were reduced and bound on forty-four tariff items or parts of items and existing tariff rates bound on another forty-six items or parts of items.[13] The countries to which concessions were granted included Austria, the Philippines, Turkey, Western Germany, Denmark and Sweden. Thus both the number of our bound duties and the number of countries with which they were negotiated are large. It is quite possible that many of the affected countries would resist, for political reasons, our use of a uniform tariff as a substitute for import licensing and that the number of exemptions suggested by Dr. Corden would have to be large. This would reduce some of the alleged advantages of the uniform tariff.

3. *Conclusion*

On the whole, it seems that Dr. Corden's proposal for a uniform tariff is politically unrealistic. It is against the existing policy of the Federal Government and against the generally accepted policy of protection (which may not necessarily be a correct one). It would bring about chaos on the side of producers and political unrest on the side of labour. What we need is a new large-scale enquiry into the effects of the present tariff policy. Thirty years have passed since 1929 when the Brigden Report was published and during that period important

11. Although Dr. Corden's uniform tariff might ultimately lead to a reduction of the tariff rates because of the return to more or less free trade policy, at the beginning it would involve amalgamation of the existing import licensing and the protective tariff and therefore an increase in the existing tariff rates.

12. See United Nations, *General Agreement on Tariffs and Trade*, Lake Success, New York, 1947, Volume 2 (Schedules of Tariff Concessions), Schedule I, pp. 1-107.

13. See The Contracting Parties to the General Agreement on Tariffs and Trade, *The Torquay Protocol to the General Agreement on Tariffs and Trade and Torquay Schedules of Tariff Concessions*, Geneva, May 1951, Annex A, Part I, pp. 1-18.

changes have occurred both in the state of Australian and world economies, and in the objectives and means of government economic policy. We need a thorough investigation of the effects of tariffs as they operate at the present stage of our economic development and the state of our economy in general, on which we could base our future international trade policy. Without such an investigation as a basis it will be difficult to get any change in the present protection policy even if that change is really required.

The criticisms of the import licensing system came generally as a result of its use as a long-run balance of payments measure. Its disadvantages are minor and not very serious if it is used as an emergency and short-term measure to protect international reserves. As such it has an important advantage—the speed and accuracy with which it restricts the value of imports. The elimination of a uniform tariff as a substitute for the system of import licensing as a longer-run balance of payments measure still leaves the Federal Government with the possibility of using exchange rate depreciation, the system of multiple exchange rates or the system of auctioning licenses. These measures do not run counter to our obligations to GATT and do not interfere with our protective tariff system.[14]

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14. I would like to take this opportunity to thank Professor Cyril Renwick and Dr. W. Hogan for their helpful comments on the draft of this article. I should also like to thank Miss Robyn Iverach of the Department of English, Newcastle University College, for the grammatical correction of the final draft. I am of course responsible for any errors which remain in the final result.

THE TEACHING OF ELEMENTARY MATHEMATICS TO UNIVERSITY STUDENTS OF ECONOMICS*

1. For some four years now students taking Economics I at the University of Sydney have found themselves faced with twenty lectures in elementary mathematics. This paper endeavours to set down some of the aims and experiences of that course in the belief that teachers in other Australian universities may find these of value, and that some mathematics teachers in the secondary schools may also be interested.

2. I do *not* intend to argue the advantages and disadvantages of the mathematical formulation of economic theory. That in itself could occupy far more time than is at our disposal. I intend to start with the observed fact that economics is increasingly being written in the mathematical language. If the students who are starting their study of the subject now are to be able, before they graduate, to understand fully the developments of the last twenty years or so, they must have certain minimum mathematical techniques at their disposal; if they are to be able to keep themselves abreast of the subject after they graduate, they must be able to add to their mathematical equipment those new parts of the mathematical thinking apparatus that further development may call upon.

3. My first question then must be: "What mathematics does the economics student need, in order to understand the mathematical treatments of economics he may reasonably expect to meet with in a University course?" I shall not be concerned in the main with the student whose interests lie in the more advanced parts of statistical economics or econometrics. Let me clear this very small group out of our consideration. They need to be exposed to as much mathematical discipline as they can be given, without prejudicing their training in economic thinking. Such students, in the main, however, are already reasonably well-trained mathematicians when they reach the University, and can secure the necessary further training from the formal courses given by the Mathematics Departments. My concern is not with these people. I am interested here in the student who wants to be what we used to call an economic theorist, and who wants to be able to read the mathematical, as distinct from the statistical, literature, of the subject—*e.g.* the "Mathematical Appendices" of so many standard texts.

4. The following list seems to be necessary if not sufficient.

(a) The algebraic formulation of simple equations and identities.

(b) The concept of functional relationship, the basic functional forms and what they look like on a graph.

* Originally read to Section G, A.N.Z.A.A.S. Conference, Adelaide, 1958.

(c) The simpler concepts of the Differential Calculus and in particular the "maximum and minimum" processes.
(d) A few particular techniques of "Algebra", *e.g.* Summation of Series.
(e) Difference equations.
(f) Differential equations.
(g) Matrices and Vectors.

I will have something to say about each of these in turn in a moment, but there are four general points that should be made.

5. We must first of all look at the mathematics that students have at their disposal before they begin their studies of Economics. The following represents the picture for last year's entrants at Sydney. I have included only students whose school examinations were in New South Wales. A substantial number have been trained overseas or in other states, but as far as I can judge their distribution is very similar. The percentage figures have been rounded off.

TABLE I

Highest mathematical examination taken by 'first attempt' Economics I students (Faculty of Economics only).

Sydney, 1958

Examination	Result	Percentages	Cumulative Percentage
Intermediate	Fail	4	
(*i.e.*, 3 year course)	Pass	12	16
Leaving : General	Fail	7	23
(*i.e.*, 5 year course)	B Pass	32	55
	A Pass	14	69
Leaving : Maths. I and II	Failed in both	2	71
(5 year course)	Failed in one	4	74
	Two B Passes	13	88
	One A, one B Pass	4	91
	Two A Passes	4	96
	Honour Passes	2	98
University Exams.	Pass	2	100

6. In the second place, may I repeat a point I touched on a moment ago: the list is "as of now". When I graduated myself in Modern Greats, no one in economics was talking about difference equations, while matrices and vectors were still only of interest to the statistician. Moreover, in the three years I had earlier spent as a student of mathematics, I had only in passing, and in fact quite accidentally, made any study of difference equations. This was a topic which university mathematicians then, as many now, regarded as curiosities that had no application in the "real" world. In the last twenty years I have had to read and use as an economist much mathematics that was outside the scope of a mathematics degree in the 1930's. In the next twenty years, there may have to be many additions to the list in the earlier section. The most we can hope to

do is to train students in mathematical ways of thought, make them mathematically literate so that they are familiar with some of the basic symbolism, and hope that the best of them may then be able to handle any new additions to the list above by preliminary study of the appropriate mathematical texts.

7. My third general point concerns the manner in which each topic should be handled. When an economic problem is formulated in mathematical terms, it is normally in the more or less "general" form. Thus we do not speak of a firm's average cost curve as being given by a specific parabola; to think about the economic problem we need only specify it as a downward pointing parabola with its vertex in the positive quadrant. In other words most of our analysis is at the "parametric" level. This has important teaching consequences. To teach mathematics to engineers one has to spend a lot of time making sure that the more or less arithmetic processes involved can be accurately carried out. The engineering application requires that numerical values can be correctly substituted for the parameters, or the particular building falls down. The economics application generally only requires that certain basic properties are understood. The engineer, then, must be taught by a series of "drill" exercises so that he can determine

$$\frac{dy}{dx} \text{ when } y = \text{Log}(4.53x^7 + 2.9x^5 + 3.45e^{7.82\sin 3x})^2$$

whereas our students need to be able to show that

$$\frac{d}{dx}\left(\frac{f(x)}{x}\right) = \frac{\dfrac{df(x)}{dx} - \dfrac{f(x)}{x}}{x}.$$

Now, from the pedagogic point of view, it is infinitely easier to teach the "engineering" type of mathematics. When the student begins to get his "drill" examples correct, he gets a personal satisfaction that fixes the concept for him, and also he can see immediate applications in the concrete world. Of course, the "engineering" student has anyhow learnt all this at school, where an enormous amount of time is available for this "drill" approach. We have neither the time to spend on numerical applications, nor, I think, can we generally make our examples realistic. But to teach at what I describe as the "parametric" level without the advantages of numerical examples makes enormously greater demands on teaching skill on the one hand, and student intelligence on the other.

8. My fourth point concerns the introduction of the multivariate concept. The number of variables entering into any reasonably realistic approximation to the real economic world is generally greater than two. If we restrict our examples of functional form to two variables, or hesitate to introduce partial differentiation, the student must always feel that our mathematical techniques in economics represent a quite intolerable stage of abstraction from the real world;

he probably has enough qualms about "literary" economics in that regard! We *must* speak of demand as a function of price and income, of more than one factor in a production function, and so on.

This is, I think, my major quarrel with mathematics as taught in the schools and the universities. A belief seems to have grown up that concepts involving more than two variables are too difficult to introduce early into mathematics syllabuses. I find this hard to believe since we live in three dimensions, and the concept of time as a fourth dimension does not appear insuperable even to the most unsophisticated. (I suspect again that the engineer and the physicist, the mathematicians' main customers, are responsible; it would seem that the possibility of using laboratory methods, and ensuring *ceteris paribus*, makes two-dimensional techniques all that are essential.)

My own view is that we should introduce our students to three-dimensional problems as early as possible. My experience has been that as soon as I demonstrate the possibilities of representing "demand surfaces" and "utility hills" the interest level of the class rises enormously. Indeed, I have been faced with an embarrassing number of students' own attempts to draw them, and even to construct wire models.

A more difficult problem arises with regard to partial differentiation, which *is* a complicated concept, but if the multi-variate approach has been used from an early stage, these difficulties are much reduced. The problem of how to teach the technique of "Lagrange's multipliers" or "Conditional Maxima and Minima" are simplified if the 3-variable situation can be demonstrated either on a diagram (which is complicated) or a model. However, I feel that particular technique is of such wide application that every effort should be made to make the student at least aware of what is involved in the process. (It will, indeed, be of use to the statisticians in the class who probably will not get this dealt with in the lectures they are presumed to be attending or going to attend from the mathematics department.)

9. I come now to a more detailed study of the topics listed in Section 4.

The Algebraic Formulation of Simple Equations and Identities

It is unfortunate, but true, that the great bulk of our students have never really understood how to write down a simple algebraic relationship. If you ask a first year (or a final year) class to express the straight-line demand curve, it is doubtful whether one in four can do it. I suspect that this springs from a basic failure to grasp what was presented to them in their first year at High School. This failure to understand the process of substituting symbols for numbers has led them to a belief that Algebra (and hence almost all analytical mathematics) is a mystic exercise the rites of which are beyond their comprehension.

The only thing to do is to repeat those early lessons. By illustrating the work by examples drawn from the subject matter of

economics, and assuming that their general mental equipment is now better than it was when they were aged 11+, one should be able to cover this in one or two lectures rather than the term's classes they must have had originally at school. One may hope that since they have chosen to study economics at a university, this gives them an incentive to try to perform these simple exercises; one may hope, too, that they are able now, as they probably were not at 11+, to think in abstract, conceptual terms.

I feel myself that if we can get the weaker students to write down simple algebraic statements about economic matters we have won a decisive battle. But to do this we have to overcome a major psychological blockage that exists with the student who has never really understood what mathematics is trying to do. I think it is necessary to devote some considerable time persuading the weak students that they are going to start their mathematics all over again, and that we shall use a different approach to that used by their school teachers. If we ask them to approach it without fear, and they *do* find that it is easy on the second attempt to understand this very elementary stuff, then one can move fairly quickly thereafter. For, of course, much of what they have been taught before falls rapidly into place, and what has been learnt as a temple dance now appears as the obvious thing to do. I know it is very unfair to a hard-working body of men and women, but to suggest that the mathematics teaching students have had in the schools was very bad (at least for our purposes), does often set the students in a frame of mind when they will try to make a genuine fresh approach to the subject.

I think, at this level, we can help by presenting mathematics as a language. I even go to the extent of suggesting that students keep a "vocabulary note-book" in which they insert new mathematical "words" as they come across them. The pedagogic advantage of this is that since they were not mathematicians at school (if they were they would be doing Science courses) it is reasonable to assume that some have done at least one foreign language to a reasonable level. One may rouse genuine interest by suggesting that mathematics has a worthwhile literature to read, some of it of economic content. They may feel that this is "baloney"—after all, they are Australian students—but at least one has put mathematics to them in a new light, and any device that can overcome their fear of the subject is worth trying. I am not really at variance with R. G. D. Allen; (cf. *Mathematical Economics,* Introduction, page xv, where he writes:) "Pure mathematics is sometimes described as a 'language', with the implication that it is easily translated into English. It is nothing of the kind; rather it is a specialized form of logic, of reasoning. A mathematical proof may be quite incapable of 'translation' though the premises from which it starts, and the consequences, can be, and should be, put into 'literary' form." All I want to do, at this stage, is to establish a new psychological approach to the subject. I think

I would disagree, however, with his statement that a mathematical proof cannot be translated if one goes to enough trouble. For I endeavour to show as early as possible that the reason why we use the mathematical language for our thinking is that by doing so we are able to avoid the intolerable circumlocutions involved in expressing in the "literary" form all the information available about a situation, and the deductions that can be drawn from it. Appendix A shows one example of what I try to do.

One final point in this context. It is well worth while spending some time on indicating what symbols to use for variables, parameters and (later) functions. Very few have ever been told what the normal conventions are.

10. *The concept of functional relationship, etc.*

If one can get the idea across that the statement that the value of one variable "is related to" the value of others, is equivalent to saying that one variable is a "function" of another (or others), the functionality concept presents no real difficulty. I think it is wise to spend some time explaining the meanings of some words, *e.g.* "implicit" and "explicit", "single-valued" and "multi-valued", not that we need to use them very much but they may meet them in their reading, and it is difficult for them to find good explanations of the terms in mathematics text.

One must make the distinction between "continuous" and "discrete" variables here, since it *is* a distinction with considerable economic implications. If it has been made early it prepares the way for difference equations at a later stage.

It is more important to move rapidly into a discussion of the basic functional forms. I think we need no more than the straight line, the parabola, cubic, rectangular hyperbola, exponential, logarithmic and sine-curve. These, I think, should be covered quickly, because the main thing to establish is basically what they look like on a graph. As one goes through them it is, of course, necessary to know how they can be used to represent functional relationships of economic significance. In doing so one can make several useful points about mathematical method in economics. I stress particularly that at all stages one is approximating to the real-world situation in order to secure the economies in expression that mathematics can provide, and this approximation *may* involve too great a sacrifice of reality. The need to specify the ranges of values within which one's relations hold, may be demonstrated by aggregating straight line demand curves into a market demand curve. Quite absurd results are, of course, obtained unless one restricts the individual demand lines to the positive quadrant.

One should also draw attention to the unfortunate nature of our demand-price diagrams which reverse the standard conventions that the independent variable should be measured along the x-axis.

The most important thing, however, is to train the students to

be able to reverse the process. They must be able to draw a graph on standard co-ordinate axes which represents the economic relationship between two economic variables. Most students seem to be able to do this. What they find difficult is to write down the analytic relationship which most simply describes the graphical relation. Why one teaches the standard functional forms is simply that they should be able to say: "This situation could be represented by a parabola", or whatever it may be, because they remember a parabola has the properties of the graph they have in front of them. This is best fixed in their minds by giving them some systematic way of analyzing the properties of the graphical relation. The problem is closely similar to that of the chemist wishing to know the elements in an unknown substance. The debt owed to the chemist is very obvious in Table II.

TABLE II

Method of determining the analytic function to represent a simple graphical relation.

1. Is slope constant?
   - Yes: Straight Line.
   - No: Ask Question 2.
2. Has it got turning values?
   - Yes: Parabola, Cubic (a), or Sine-Curve: Ask Question 3.
   - No: Hyperbola, Exponential, Logarithmic or Cubic (b): Ask Question 4.
3. How *many* turning values?
   - One: Parabola.
   - Two: Cubic (a).
   - Many: Sine-Curve.
4. Is it asymptotic to either or both axes (or lines parallel to either axis)?
   - Neither: Cubic (b).
   - Both: Hyperbola.
   - X axis only: Exponential.
   - Y axis only: Logarithmic.

This does have its faults, but for the weak student is quite sufficient. (It will not pick up simple combinations of two functions, *e.g.* $y = ax + b + \frac{c}{x}$, which is a reasonable average cost curve and is *not* a parabola.) The better student will soon appreciate the footnotes that need to be added.

I have elaborated this point because I believe this process of drawing a graph, then determining the function, and then operating on the function, is the way mathematical economics gets written, but it is *not* the way mathematics is taught in the schools.

11. *The simple concepts of the Differential Calculus, etc.*

Of course, we have to teach the Calculus. It is wise, however, to talk for some few lectures about slopes of curves, rates of growth, etc. (linking this to "marginal" and "elasticity" concepts), all this growing out of the analysis of functional forms, before one uses the word Calculus. The mathematically good student knows what you are about; the weaker one is very happy to discover that this stuff he has been able to understand is really that awfully difficult subject he has thought well beyond him.

My early points about "drill" are very relevant in this context. They need, I think, to be able to differentiate x^n (n positive or negative), Log x, e^x, sin x and cos x; they need the rules for the product, quotient, and "function of a function"; they need the rules for determining maximum and minimum values; they need some ideas about partial differentiation, and the corresponding maximum and minimum determinations. They really need drill if these ideas are to be fixed in their minds, but equally they need to be convinced that these techniques are of value in Economics. Even if in our theory-of-the-firm experts have abandoned much of the old marginalist theory, some of these necessities can be secured by going through the relationships between marginal and average cost and revenue curves. It is also possible here to establish the economy of mathematical exposition in a way that is not otherwise readily available to students whose progress in Economics has not yet been great. Moreover, if they can gain facility at this stage in handling the calculus concepts, when they later come to the macroeconomic fields and more detailed microeconomics, the better ones at least will not be completely at sea.

12. *Summation of series.*

The Multipliers need the "summation of series" techniques, and such little use as there is for Integration may well be based upon series summation, but its place here depends largely upon the practical fact that, in my Sydney course, I have by now only one lecture left with the first year students, and this does make a short compact topic.

13. *Difference equations, differential equations, vectors and matrices.*

Though I have hopefully written the lectures on these topics, I have never delivered them, and I have no experience to draw on. I feel that they would be beyond the comprehension of the bulk of the first year students (except perhaps difference equations) but might perhaps be introduced to later years. However, there are several satisfactory (more or less so) treatments available in other places, and students with the training that this first-year course has given them should, I hope, be able to approach these with fewer fears than their predecessors (including perhaps their teachers!). Provision of compulsory lectures in these topics in higher years may be an uneconomic use of teaching resources and students' time. I

think we must accept the fact that only those who come to us already well trained in mathematics will ever be completely in command of these topics, and optional lectures, with possibly opportunities for specialization in mathematical economics, are the better ways to provide for them.

14. My final point returns to my Table I. I have not been able to secure comparable figures for the students matriculating at Sydney as a whole, but it must certainly be true that the previous mathematical attainments of our students is far lower than that of some other faculties, notably Science and Engineering. My observation of the position in New South Wales is that the majority of boys (and girls) who show any mathematical ability at school are under the impression that the only university courses which will enable them to exploit those abilities are Science and Engineering. A few children who are interested in Mathematics, but are not practically minded, find themselves encouraged to take an Arts course majoring in Mathematics, and now and again a few accidentally take Economics I as part of an Arts degree. But an Arts degree in Mathematics leads in the main to school teaching, and, in New South Wales at any rate, the shortage of teachers of Mathematics is such that any person qualified to teach Mathematics is fully occupied in that subject, and there seems no hope of school Economics ever being taught by a Mathematics master. That the mathematical ability can be capitalized on in the study of Economics seems to be unknown among all but two of the New South Wales High Schools; vocational guidance officers and Mathematics teachers appear equally unaware that it can provide opportunities not only for the highest academic achievement but also of better financial return than the sciences. The knowledge that we have had these lectures in the Economics I course over the last four years seems only now to be penetrating to the schools. The reaction has been only of irritation that one more opening for the non-mathematician has been blocked, not of a widening of opportunities for the mathematical child.

I have no doubt that similar attitudes exist in other states. I have been somewhat presumptuous in the rest of this paper in making suggestions to colleagues who are as good if not better teachers than myself. May I end on a modest note and ask for suggestions as to how we can penetrate the schools and attract to our subjects those students who can understand Economics in its modern forms and possibly in due time make in it substantial advances. Though there are many literary fields still to be tilled in Economics, I cannot feel that Australia will be able to hold any place in the world stream of economic thought unless we, too, can produce theoretical economists able to read and understand mathematical expositions, and perhaps one or two who might themselves make contributions as mathematical economists.

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APPENDIX A

(See section 9)

ECONOMICS I — 1956

Mathematics Course

Translation of literary statements into mathematical form.

LITERARY FORMS

Statement I

The income of this Sydney family, with one child, in 1955 is £20 a week and its weekly milk consumption is 10 pints.

Statement II

For Sydney families, with one child, in 1955,
where the weekly income is £10 or less, no milk is consumed,
where the weekly income is £20, the weekly milk consumption is 10 pints,
where the weekly income is £21, the weekly milk consumption is 11 pints,
where the weekly income is £22, the weekly milk consumption is 12 pints,
etc.

Statement III

For Sydney families, with one child, in 1955,
weekly milk consumption is related to weekly income.

Statement IV

As in Statement III followed by
"in such a way that for every £1 weekly income over £10, an extra weekly pint of milk is consumed."

Statement V

At any time, and in any place, the weekly milk consumption by one-child families is related to weekly income in such a way that for every extra £1 weekly income over a certain fixed amount, fixed for each time and place, but varying between times and places, a certain extra amount of milk is consumed per week, this extra amount being fixed for any given time and place, but varying between times and places.

Statement VI

At any time and in any place, the weekly consumption in physical units of any given commodity by families of a given constitution, is such that for every extra £1 of weekly income over a certain amount, fixed for each time, place, family constitution and commodity, but varying between times, places, family constitutions and commodities, a certain extra amount of the commodity is consumed, this

extra amount also being fixed for each time, place, family constitution and commodity but varying between times, places, family constitutions and commodities.

MATHEMATICAL FORMS

Vocabulary:

M_r = Weekly milk consumption, in pints, of one-child family (r), Sydney 1955.

I_r = Weekly income, in £s, of one-child family (r), Sydney, 1955.

Statement I. If $I = 20$, $M = 10$

Statement II. If $I_1 = 10$, $M_1 = 0$

$I_2 = 20$, $M_2 = 10$

$I_3 = 21$, $M_3 = 11$

$I_4 = 22$, $M_4 = 12$ etc.

Statement III.

$$M_r = f(I_r)$$

(read "M_r is a function of I_r".)

Statement IV.

$$M_r = 1 \times (I_r - 10), \quad r = 1, 2, 3 \ldots \ldots \ldots \ldots n.$$

Vocabulary:

n = total number of families considered.

Statement V.

$$M = a \times (I - b).$$

Vocabulary:

M = weekly milk consumption, in pints, by any one-child family.

I = weekly income, in £s, by same family.

a, b, are "parameters" relating to milk consumption fixed for any given time and place, but varying between times and places.

Statement VI.

$$C = a(I - b).$$

Vocabulary:

C = weekly consumption of any given commodity, by any family of specified family constitution, at a given time and place.

I = weekly income, in £s, of same family.

a, b, are new "parameters" relating to the given commodity, time, place and family constitution.

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INTE

SOLD BY \ SOLD TO	1.
1. Sheep	.....
2. Other rural	13.200
3. Beer, tobacco	.....
4. Foodstuffs	8.110
5. Woodworking	.....
6. Paper, printing	.....
7. Chemicals, rubber, misc. manufactures	11.300
8. Textiles, clothing, leather, footwear	6.090
9. Coal	.....
10. Other mining, refining, non-ferrous rolling	.....
11. Oil refining	11.200
12. Gas, electricity	.....
13. Iron and steel	.....
14. Radio and electrical	.....
15. Motor vehicles	.....
16. Other engineering	32.400
17. Building materials and building	.....
18. Transport	13.825
19. Commerce	82.929
20. Other services	2.271
Employees '000m.years	81.806
Wages	48.500
Non-wages	197.029
Depreciation	28.700
14 taxes	18.400
Subsidies	.....
Customs, excise & sales tax	.....
Imports c.i.f. (competing)	1.269
Imports c.i.f. (non-competing)	.....
Total cost (at purchaser's value less internal sale) of supplies	475.223

* Each row shows sales of output of pr

Note: Includes Personal Consumption

INTER-INDUSTRY FLOW OF GOODS AND SERVICES BY INDUSTRY OF ORIGIN

	PURCHASING INDUSTRIES													
0	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
	.....	.....	.....	1.329	.....	.....	.....	66.830	.....	.....	.....	.....	.....	.....
	13.200	.....	36.415	246.362	52.009	3.309	21.107	11.589	0.012	0.880	1.552	0.759	1.345	0.0
	.....	.....	.....	0.151	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	8.110	28.400	4.063	.....	.....	.....	1.271	.....	.....	.....	.....	.....	.....	.....
	.....	0.330	0.509	3.293	.....	0.847	3.818	0.038	1.503	2.149	.....	.....	0.467	3.0
	.....	.....	4.082	17.362	0.279	.....	9.623	3.526	.....	.....	.....	.....	.....	1.6
c.	11.300	21.600	6.275	9.877	0.751	4.010	.....	3.161	1.327	3.722	.....	.....	.....	1.3
	6.090	7.800	.....	4.968	1.823	.....	11.131	.....	.....	.....	.....	0.037	.....	.....
	.....	.....	0.563	3.601	0.110	1.681	3.191	0.915	.....	0.527	0.014	52.706	0.817	0.0
r,	.....	.....	.....	.....	0.095	.....	22.102	.....	.....	.....	.....	.....	14.113	19.3
	11.200	32.100	0.402	2.102	0.894	0.361	3.685	1.161	0.162	2.269	.....	7.795	1.251	0.2
	.....	.....	0.893	6.650	1.899	1.872	7.792	3.674	1.705	6.634	0.662	.....	15.086	1.7
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.1
	.....	.....	0.167	0.734	0.351	0.245	0.716	0.462	.....	0.253	0.105	1.166	0.588	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	32.400	32.190	2.646	29.207	5.028	2.912	11.938	5.479	5.528	15.593	3.367	4.742	13.838	16.1
	.....	1.280	.....	.....	.....	0.367	.....	.....	.....	.....	.....	.....	0.846	.....
	13.825	54.893	5.763	34.531	10.536	3.836	18.718	12.975	28.097	18.611	37.798	3.298	7.649	0.7
	82.929	159.654	109.190	122.817	39.074	27.156	91.332	166.102	0.010	2.468	124.307	32.510	.....	13.3
	2.271	3.925	4.387	19.865	11.910	10.717	26.993	25.695	4.572	12.613	3.186	5.532	5.048	9.9
s	81.806	135.810	14.099	104.892	76.920	61.151	91.811	183.930	25.961	49.567	4.144	17.984	24.304	54.0
	48.500	80.518	12.718	84.395	60.885	53.256	80.575	121.626	27.949	52.453	4.545	18.601	25.987	45.1
	197.029	359.527	9.861	50.237	25.351	27.914	47.003	43.681	11.039	56.304	13.406	22.203	14.928	9.2
	28.700	91.735	1.804	8.601	2.548	4.715	9.146	4.790	2.141	4.786	5.660	8.783	3.556	2.2
	18.400	9.365	0.712	4.552	2.834	2.602	4.170	5.581	1.173	2.741	0.490	1.222	1.302	1.9
	.....	-14.680	.....	- 1.734	.....	.....	- 0.513	- 0.038	- 0.027	- 0.401	.....	.....	.....	.....
es tax	.....	12.721	151.398	29.656	9.053	5.647	40.975	25.705	0.566	1.166	40.311	.....	1.840	5.5
ting)	1.269	38.156	3.238	22.736	27.771	51.333	122.632	127.469	0.068	37.272	66.063	0.098	46.304	30.9
ompeting)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60.768	.....	.....	.....
er's sale)	475.223	919.514	355.084	701.290	253.162	202.782	537.403	630.424	85.823	220.039	362.233	159.451	154.944	163.9

es of output of producing industry named at left. Each column shows purchases by industry numbered at top.

rsonal Consumption and Government expenditure exluding Public Works. Public Works are included in Fixed Investment.

ER-INDUSTRY FLOW OF GOODS AND SERVICES BY INDUSTRY OF ORIGIN AND DESTINATION, 1955-56 (PURCHASER'S VALUES £m.)

PURCHASING INDUSTRIES												PURCHASERS FOR FINAL USE										
2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	Current Home Final Demand	Fixed Investment	Exports	Stock rise	Aggregate Final Demand	Total Sales
.....	.....	1.329	.....	.....	.....	66.830	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89.837	.....	318.855	+ 4.373	407.065	475.223
.....	36.415	246.362	52.009	3.509	21.107	11.589	0.012	0.880	1.552	0.759	1.345	0.017	0.014	0.149	1.527	0.557	.....	.....	382.727	.....	126.357	+19.627	528.711	919.314
.....	.....	0.151	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	303.000	.....	2.691	- 0.758	354.933	355.084
28.400	4.063	.....	.....	.....	1.271	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.270	3.240	1.812	505.231	.....	139.770	+ 8.124	653.125	701.290
0.330	0.509	3.293	.....	0.847	3.818	0.038	1.503	2.149	.....	.....	0.467	3.087	1.544	4.199	139.237	1.284	3.328	3.184	78.653	.....	2.903	+ 2.790	84.346	253.162
.....	4.082	17.362	0.279	.....	9.623	3.526	.....	.....	.....	.....	.....	1.685	.....	.....	1.870	1.161	28.902	31.077	98.254	.....	2.523	+ 2.437	103.215	202.782
21.600	6.275	9.877	0.731	4.010	.....	3.161	1.527	3.722	.....	.....	.....	1.331	20.212	3.234	41.175	10.337	7.254	17.148	335.344	.....	25.908	+13.457	374.709	537.403
7.800	.....	4.968	1.823	.....	11.131	.....	.....	.....	.....	0.037	.....	.....	.....	.....	0.048	2.187	3.544	20.465	507.518	.....	49.000	+15.813	572.330	630.424
.....	0.563	3.601	0.110	1.681	3.191	0.915	.....	0.527	0.014	52.706	0.817	0.073	0.133	0.585	5.302	14.055	.....	.....	0.618	.....	0.946	- 0.012	1.551	85.823
.....	.....	.....	0.095	.....	22.102	.....	.....	.....	.....	.....	14.113	19.361	4.483	47.635	28.908	0.530	.....	.....	0.224	.....	69.473	+13.116	82.812	220.039
32.100	0.402	2.102	0.894	0.361	3.685	1.161	0.162	2.269	.....	7.795	1.251	0.241	0.587	4.605	2.285	36.886	75.669	2.269	141.925	.....	13.512	+20.873	176.309	362.233
.....	0.893	6.650	1.899	1.872	7.792	3.674	1.705	6.634	0.662	.....	15.086	1.703	2.231	8.706	2.920	8.231	15.951	7.825	72.270	.....	0.538	- 7.792	65.016	159.451
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.156	8.379	86.232	9.582	0.023	.....	.....	.....	.....	4.053	+45.519	49.572	154.944
.....	0.167	0.734	0.331	0.245	0.716	0.462	.....	0.253	0.165	1.166	0.568	.....	0.385	10.821	7.211	0.128	0.489	9.559	77.414	48.410	2.517	+ 2.231	130.572	163.911
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.593	4.842	0.288	56.824	277.000	2.324	+ 6.102	342.250	361.973
32.190	2.646	29.207	5.028	2.912	11.938	5.479	5.528	15.593	3.367	4.742	13.838	16.106	8.063	.....	69.679	15.887	1.843	5.962	199.800	303.590	17.020	+ 8.101	528.511	810.918
1.280	.....	.....	.....	0.367	.....	.....	.....	.....	.....	.....	0.846	.....	.....	.....	.....	0.227	.....	1.060	14.792	754.000	0.725	.....	769.517	773.297
54.893	5.763	34.531	10.536	3.836	18.718	12.975	28.097	18.611	37.798	3.298	7.649	0.750	12.549	26.574	6.632	.....	.....	.....	186.270	.....	.....	.....	186.270	483.305
159.654	109.190	122.817	39.074	27.156	91.332	166.102	0.010	2.468	124.397	32.510	.....	13.317	68.133	112.282	14.759	.....	.....	.....	.....	.....	.....	.....	.....	1,166.040
3.925	4.387	19.865	11.910	10.717	26.993	25.695	4.572	12.613	3.186	5.532	5.048	9.989	18.442	31.040	28.269	12.781	65.535	.....	276.539	.....	85.200	.....	361.739	664.510
135.810	14.099	104.892	76.920	61.151	91.811	183.930	25.961	49.567	4.144	17.984	24.304	54.068	97.508	235.633	300.476	263.100	516.389	378.449	443.579	.....	.....	.....	443.579	3,161.641
80.518	12.718	84.395	60.885	53.256	80.575	121.626	27.349	52.453	4.545	18.601	25.987	45.154	83.981	212.581	271.587	283.888	433.670	260.732	396.000	.....	.....	.....	396.000	2,659.000
359.527	9.861	50.237	25.351	27.914	47.003	43.681	11.039	56.304	13.406	22.203	14.928	9.273	16.464	54.021	121.889	50.777	474.410	172.938	.....	.....	.....	.....	.....	1,778.257
91.735	1.804	8.601	2.548	4.715	9.146	4.790	2.141	4.786	5.660	8.783	3.556	2.242	4.424	7.402	2.892	15.077	21.910	36.682	.....	.....	.....	.....	.....	267.595
9.365	0.712	4.552	2.834	2.602	4.170	5.581	1.173	2.741	0.490	1.222	1.302	1.986	3.679	9.222	4.243	17.776	26.053	32.809	43.820	.....	.....	.....	43.820	194.733
-14.680	.....	- 1.734	.....	.....	- 0.313	- 0.038	- 0.027	- 0.401	.....	.....	.....	.....	.....	.....	.....	- 4.551	.....	.....	.....	.....	.....	.....	.....	-21.744
12.721	151.398	29.656	9.053	5.647	40.975	25.705	0.566	1.166	40.311	.....	1.840	5.532	17.663	20.900	2.633	.....	.....	.....	.....	.....	.....	.....	.....	365.764
38.156	3.238	22.736	27.771	51.333	122.632	127.469	0.068	37.272	66.063	0.098	46.304	30.905	90.608	170.730	10.648	.....	.....	60.700	.....	.....	.....	.....	.....	908.001
.....	.....	.....	.....	.....	.....	.....	.....	.....	60.768	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60.768
919.514	355.084	701.290	253.162	202.782	537.403	630.424	85.823	220.039	362.233	159.451	154.944	163.911	361.973	810.918	773.297	483.305	1166.040	664.510	3,811.060	1,383.000	864.315	154.000	.....	15,693.701

oducing industry named at left. Each column shows purchases by industry numbered at top.

and Government expenditure exluding Public Works. Public Works are included in Fixed Investment.

NOTES

INTER-SECTOR ACCOUNTS, 1955-56*

The attached table is the third of a series of twenty sector transactions tables. Earlier tables were for the years 1946-47 and 1953-54. The national income aggregates in this table are quite close to official estimates and reconciliation statements are available. National income estimated in this table at £4,437m. is £10m. in excess of the official estimate.

Inter-sector accounts systematize on a single classification a bulk of statistics only otherwise readily available on diverse classifications. It may be that in this lies their greatest value, being used (like the national income white paper) as a convenient source of statistics.

Transactions tables can, however, be used in a more sophisticated way to produce new statistical series. For example, Table I shows the components of aggregate demand in terms of their estimated factor content. The transactions table for 1946-47 was not quite on an identical basis with the later tables, so the figures might be regarded as giving orders of magnitude rather than signifying trend. Table II proceeds a stage further by taking one of these components, exports, and estimating the G.N.P. contribution by industrial groups. (The distinction drawn here between wool exports (£149m. in 1946-47) and G.N.P. contribution of the wool industry to total exports (£105m. or 33·9% of exports) is that only part of the value of wool exported is value added by the wool industry, part being added in the superphosphate, transport and other industries.) In all such calculations, results may be biased by aggregation.

This transactions table is the last of its series, leaning as it does to some extent on studies made for the earlier years when larger tables were compiled.[1] New studies of the last four "service" industries are a pre-requisite for future tabulations of this type. Such studies are, however, beyond the financial capacity of a small research group. It would seem that the time is now ripe for the Commonwealth Bureau of Statistics to follow the lead of such countries as the United Kingdom, New Zealand and Canada, and furnish official inter-sector accounts as a supplement to the existing national income accounts.

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*This 20 sector transactions table for 1955-56 has been compiled by Laura Hodan. We have been helped by Jill Pertoldi, Margaret Charlesworth and David Evans. The work owes much to the assistance of the Commonwealth Bureau of Statistics and Department of Trade.

1. See *Economic Record*, December, 1957, and December, 1958.

TABLE I

Factor Content of Final Demand

	Value £m.			Import content %			Wage content %			Other G.N.P. content %		
	46–7	53–4	55–6	46–7	53–4	55–6	46–7	53–4	55–6	46–7	53–4	55–6
EXPORTS net of re-exports	310	898	864	4·3	5·9	5·9	37·9	33·9	35·2	57·8	60·2	58·9
FIXED CAPITAL INVESTMENT public and private	261	1,137	1,383	16·5	19·7	19·7	53·5	48·5	48·9	30·0	31·8	31·4
OTHER DEMAND (consumption, current Govt. and stocks)	1,255	3,283	3,965	13·8	15·7	16·3	42·1	41·9	42·3	44·1	42·4	41·4

TABLE II

Contribution, in terms of Gross National Product, of industrial groups to the Export Bill of Goods.

Industry	Exports £m.			G.N.P. Contribution (as % of total exports at bottom of column)		
	46–7	53–4	55–6	46–7	53–4	55–6
Sheep, textiles	149	437	368	33·9	33·0	26·1
Other rural, food factories	108	264	269	19·8	17·1	18·5
Power, fuels	1	3	15	1·9	1·7	2·1
Other mining	19	65	69	5·0	4·9	5·6
Engineering	15	31	26	4·9	4·6	4·2
Transport, commerce ..	7	—	—	21·2	20·9	22·5
Other industry	11	98	117	9·0	11·9	15·1
Import content	—	—	—	4·3	5·9	5·9
Total Exports £m.	310	898	864	310	898	864

Appendix

In using Australian transactions tables, different variants of the basic open model have been used. It now appears that the variant most suited for Australian tables of the type here given is the following:

$$X_i + M_i = \sum_j x_{ij} + FHD_i + E_i$$

in which $x_{ij} = a_{ij}X_j$

and $M_i = k_i + m_i(X_i - E_i)$, let $k_i = 0$ in general,

where X_i output of commodity i (more correctly "apparent Australian content of supplies of i")

M_i imports c.i.f. of i (more correctly "apparent import content of supplies of i")

FHD_i final home demand for i

E_i export demand for i

Since re-exports have been excluded, elementary trade theory asserts that a commodity will not be both imported and produced for export. So the competitive import content of sales for export will be zero.

In estimating factor content of exports and similar statistics, these equations are to be regarded as identities. In analysis (*e.g.* forecasting) they are not identities and involve hypotheses as to the form of production functions and import propensities.

DEPRECIATION AND THE CAPITAL STOCK

This note arises from Section V of the article by W. Hogan in the August, 1959, issue of this journal.[1]

Suppose that gross investment (all aggregates are measured in constant prices in this note) grows exponentially, so that at time t, it is given by e^{rt}, where r is the constant rate of growth per year. The stock of capital in existence at time t, will then depend on the way in which capital equipment decays over time. If we assume that capital equipment has a life of m years, and that it retains its effectiveness in full until the end of m years, when it ceases to be effective, the stock of capital in year t, for large t, will be given by

$$K_t = \int_{t-m}^{t} e^{rt}dt$$
$$= \frac{e^{rt}(1-e^{-rm})}{r}$$

This result is given by Dr. Hogan, following Domar.[2] It should be noted that for $r = o$, the stock of capital will rise to m and remain stationary at this level. This can be seen by expanding e^{-rm} in the expression for K_t.

An alternative assumption to that of "sudden decay" is that of "linear decay", in which capital equipment loses its effectiveness by $1/m$ of its original effectiveness per year over its lifetime of m years. Dr. Hogan examines this assumption also, but the expression, which he gives, for the capital stock at time t, is incorrect. Dr. Hogan's expression ((20) on p. 206) is

$$\frac{e^{rt}(1-e^{-rm})}{r}\left[1-\frac{1-e^{-rm}}{rm}\right]$$

That this is incorrect can be seen by evaluating this expression for $r = o$. Its value is o for $r = o$, when clearly it ought to be $m/2$. Dr. Hogan derives the above expression by subtracting from K_t above, the total decay occurring in the m years prior to t. This total contains the decay of gross investment occurring prior to t—m, so that too much has been subtracted from K_t.

The correct expression for the stock of capital on the assumption of linear decay is given by

$$K_t^* = \int_o^t e^{rt}dt - \int_m^t \frac{e^{rt}(1-e^{-rm})}{rm}\,dt - \int_o^m \frac{e^{rt}-1}{rm}\,dt$$

The first term gives the total of gross investment up to time t, the second term gives the total of decay from time m to t (the integrand being decay at time t for $t>m$), and the third term gives the total

1. W. Hogan, "The Equality of Replacement and Depreciation", *Economic Record*, August, 1959, p. 205.

2. E. D. Domar, "Depreciation, Replacement and Growth", *Economic Journal*, March, 1953, pp. 1-32.

of decay from time o to m (the integrand being decay at time t for $t<m$). Integrating the above expression we have for large t:

$$K^{*}_{t} = \frac{e^{rt}}{r}\left[1 - \frac{1-e^{-rm}}{rm}\right]$$

For $r = o$, the stationary stock of capital will be $^{m}/_{2}$.

A third assumption (not explored by Dr. Hogan) is that of "exponential decay". We assume that capital equipment loses $^{1}/_{m}$ of its current effectiveness per year. The stock of capital will then be given by the solution of

$$\frac{dK}{dt} = e^{rt} - \frac{K}{m}.$$

This gives, for large t, a stock of capital of:

$$K^{**}_{t} = \frac{m}{rm+1}e^{rt}.$$

For $r = o$, this gives a stationary stock of capital which tends to m units for large t.[3] The ratios $^{K*}/_{K}$ and $^{K**}/_{K}$ are functions of rm and they are tabulated against values of rm in the table below. The column for $^{K*}/_{K}$ differs from that implied in Dr. Hogan's Table III, for the reason indicated above. It is interesting to note that for values of rm likely to be met in practice the ratio $^{K**}/_{K}$ is remarkably stable, K** being about 77% of K.

rm	$^{K*}/_{K}$	$^{K**}/_{K}$
0	0·500	1·000
0·5	0·542	0·847
0·8	0·566	0·807
0·9	0·574	0·798
1·0	0·582	0·791
1·1	0·590	0·785
1·2	0·598	0·781
1·3	0·605	0·777
1·4	0·613	0·774
1·5	0·621	0·772
1·6	0·628	0·771
1·7	0·635	0·770
1·8	0·642	0·770
1·9	0·650	0·770
2·0	0·657	0·771
3·0	0·719	0·789
4·0	0·769	0·815
5·0	0·807	0·839
6·0	0·836	0·860
∞	1·000	1·000

The above analysis has been in terms of comparing the real stocks of capital which would be built up from a given stream of gross investment under three different assumptions about capital decay. It can, of course, also be used to throw light on the relation between the effective stock of capital and the "book value" measure of this

3. I am indebted to Professor E. S. Barnes for assistance with the mathematical aspects of the above analysis.

stock. The "book value" measure will depend on the method used for calculating depreciation. If "straight line on historical cost" is used, then K^* will be the figure; if "reducing balance" is used, then K^{**}.

In practice, the figure will probably be somewhere in between. On the other hand, the figure for the effective stock of capital is likely to lie between K and K^*. It is true that much capital equipment may retain its effectiveness until it is scrapped, but it is likely that its effectiveness in terms of its net output will deteriorate as it ages, both because its physical productivity may be impaired and because maintenance costs may rise. To illustrate a possible relation between book-value capital and effective capital, we take the case where gross investment is divided equally between capital with sudden decay and capital with linear decay on the one hand and between straight line and reducing balance depreciation on the other hand. The ratio between book value and effective capital will be given by

$$\frac{K^* + K^{**}}{K^* + K}$$

This ratio is tabulated below against rm.

rm	$\frac{K^* + K^{**}}{K^* + K}$
0	1·00
0·5	0·90
1·0	0·87
2·0	0·86
4·0	0·90
6·0	0·92
∞	1·00

On these sorts of assumptions, admittedly very rough and ready, a capital-output ratio based on book-values might perhaps have to be marked up by one-sixth to accord with the effective ratio.

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DEPRECIATION AND THE CAPITAL STOCK : A REPLY

I

Professor Karmel's interesting comment on the last section of "The Equality of Replacement and Depreciation" shows forcibly the difficulties in the way of interpreting satisfactorily mathematical analyses of economic phenomena. The real argument between us comes down finally to a different understanding of the topic being discussed.

I agree that Professor Karmel has stated the problem correctly in terms of his fourth equation dealing with the gross capital stock K^*. This gives an estimate of the gross capital stock under an assumption of linear decay of the productive capacity of assets. Given an

rm = 0 then the values of the three measures of the gross capital stock are K = m, K* = m/2, and $K = 0$ where m is the average life of assets. Clearly, Professor Karmel's complaint against the third measure is valid and his estimate of K* accords with common sense. Therefore the ratio K*/K is 0·5 under these assumptions. The derivation of this ratio is no different from the circumstances of Professor Domar's original work where he was calculating the ratio of replacement to depreciation.[1] In the first m years of investment in an economy, the ratio K*/K will steadily decline because it is weighted in the early years by the low amounts of wearing out during the opening phases of capital accumulation. It is not until the end of this initial period that we find a constant ratio. It is only in this sense that Professor Karmel can sustain the claim about my deducting too much replacement; in other words, my series should have commenced from t = 0 rather than t—m.

Professor Karmel is rightly worried because my K does not give the theoretically correct result for the gross capital stock under an assumption of linear decay. What was being attempted in the article was the finding of a formula for the gross capital stock when using gross investment for the preceding m years and deducting amounts assumed for decay over the same period. This is the only sort of information we can observe, as it is not possible to return to the dawn of economic history for details of investment. All we have, then, is my two measures of the gross capital stock, K and K, or some measure very like them. Hence, it can be said that Professor Karmel's K* provides an ideal solution, whereas my K is a second-best attempt based upon the limited available knowledge.

The problem I had in mind was to find a series for the gross capital stock which might provide a reasonable approximation to the actual situation in the economy. With Professor Karmel's contribution, this comes down to asking which of the observed series K or K is the nearest approximation to K*. In the case where rm = 0, both are of equal use. But in all other cases where rm has a value greater than zero, the K is a better measure. That this is the case can be seen from the following table. For all reasonable values of rm the margin between the two ratios is not as great as might be imagined.

Comparison of Capital Stock Ratios

rm	$K^*/_K$	$K/_K$
0	0·500	0
0·5	0·540	0·213
1·0	0·582	0·368
1·5	0·621	0·482
2·0	0·657	0·568
3·0	0·719	0·683
4·0	0·769	0·755

1. E. D. Domar, "Depreciation, Replacement and Growth", *Economic Journal*, March 1953, especially pp. 3-7.

Nevertheless, Professor Karmel has produced the ideal solution for which we should be grateful, as this presents the stimulating conclusion that my K is a better approximation than K when rm is greater than zero—a situation which is not obvious from earlier arguments.

II

In the latter part of his comment Professor Karmel develops another expression for the wearing out of assets; the pattern is that of exponential decay. Alternative methods have been devised, but the danger, to my way of thinking, is the confidence they foster in the stability of the relationships between various measures of the capital stock. Without wishing to disparage efforts to link book values and productive capacity of assets, I would stress the sharp differences between the financial and real aspects of the problem. Hence the distinction between depreciation and replacement.

It is reasonable to divide the gross value of production into three categories: the surplus comprising mainly profits, salary and wage charges, and the cost of materials for production. The financial valuation of capital is geared to the size of the surplus. Hence decisions to discard an old plant and buy a new one are based upon profitability rather than physical productivity. The measure of output is provided by the first and second categories in the sense of net income produced; this assessment is relevant to aggregative treatments. However, the gross output derived from the total value of production is considered in some instances such as industry studies. Increased costs of maintenance may involve additional labour costs and materials. If it is labour alone, the size of the surplus will be squeezed but income produced will not be affected. Should additional materials costs be incurred, then both the net income produced and the surplus will fall. Thus there is every reason for thinking that the surplus will fall more rapidly than net income produced or the gross value of production.

As it is the surplus which determines largely the valuation of assets, the financial estimates of depreciation are based upon changes in this aggregate. We can readily envisage the situation where net income produced is stable while asset values are declining. In other words, changes in the productive capacity of an asset are divorced from the manipulations associated with depreciation. A gulf between the real and monetary aspects of measuring the capital stock is created.

Replacement is a viable concept only when it is linked to changes in productive capacity. Therefore it seems unsatisfactory to associate this matter with depreciation which, for most purposes, reflects interpretation of financial activities. Therefore, I would not be inclined to press too far any calculations showing stable relationships between book values and productive capacity, especially when price changes are excluded.

W. P. HOGAN

Newcastle University College.

NEWS AND NOTES

Sir Leslie Melville, Vice-Chancellor of the Australian National University, has been appointed Chairman of the Tariff Board. He will take up duties in his new post later this year.

A special number of *The Economic Record* (No. 73, March 1960) has been published, containing essays in honour of Professor Sir Douglas Copland. Contents of the special issue are shown in an advertisement facing page 179, and should be of particular interest to those who have worked with or known Sir Douglas. Copies will be sent free to all subscribers and Branch members of the Economic Society. They are otherwise obtainable at a price of 14/- each.

Sir Alexander and Lady Fitzgerald will go overseas in April for a five or six months' visit. Sir Alexander is chairman of a newly-formed company, International Computers and Tabulators (Australia) Pty. Ltd.; while he is away he will meet directors and inspect training courses and factories of the English parent company.

The Editor of *The Economic Record*, Professor R. I. Downing, is now taking sabbatical leave in Europe. After a short time in London, Cambridge and Paris, he will work at the International Labour Office in Geneva studying economic and social implications of closer integration in Europe, and the question of employment objectives in relation to economic development. Dr. G. S. L. Tucker and Mr. F. G. Davidson will act as editors of *The Economic Record* during Professor Downing's absence.

Dr. C. A. Blyth, Fellow and Tutorial Bursar of Pembroke College, Cambridge, and University assistant lecturer in Economics, has been appointed first Director of the New Zealand Institute of Economic Research at Wellington. The primary object of the Institute will be to conduct research into the economic problems of New Zealand, with special reference to economic development.

Copies of the *Bibliography of Research in the Social Sciences in Australia 1954-1957* are still available and may be obtained from the Secretary, Social Science Research Council of Australia, Academy of Science Building, Canberra City, A.C.T. Price (including postage): Australia, 5/6; United Kingdom, 5/6 stg.; U.S.A. and Canada, $1.

BRANCH SECRETARIES

New South Wales: J. R. Wilson, c/o Department of Economics, University of Sydney, Sydney, N.S.W.

Victoria: Dr. W. M. Corden, Department of Commerce, University of Melbourne, Parkville, N.2, Victoria.

Queensland: C. P. Harris, Department of External Studies, University of Queensland, St. Lucia, Brisbane, S.W.6, Queensland.

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Christchurch: N. L. McBeth, c/o "Press", The Square, Christchurch, New Zealand.

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REVIEWS

Economics for Pleasure. By G. L. S. SHACKLE. (Cambridge University Press, London, 1959.) Pp. x + 269. 21/- stg.

Economics for Pleasure, the dust-jacket states, contains "the essence of economics in good, plain English, without diagrams or mathematics". It may not be the housewife's idea of good, clean fun, but it gets as close to light reading as a serious book on economics can.

Its clarity owes much to its organization. There are eight books, each of four chapters; every chapter first illustrates its topic from real life and then examines the theory involved. Development proceeds steadily; the first two books (Value and Production) evolve a simple economic model made explicit in the third (Income). Thereafter, various refinements are introduced; the system expands through time, government intervention and planning are introduced, and the economy becomes an open one.

A feature of the book is precision tempered with realism. Definition gets careful attention, and all technical terms are distinguished by italics. This, with the symmetry of organization, suggests a system going by clockwork; but it is corrected partly by making practice precede precept in each chapter, and partly by applying to each theory "the test of whether it rests ultimately on human tastes and values".

Professor Shackle acknowledges his obvious debt to Marshall, but modern thought is smoothly absorbed into his unified scheme. Keynesian analysis, appraised in the light of recent experience, is incorporated. While pure competition is examined as one special form of equilibrium, more general cases are also mentioned (there is even in Chapter Seventeen—Bargaining—some foreshadowing of Games Theory). We meet the basic conditions for growth in backward economies as early as Chapter Two.

Perhaps the self-denying ordinance against diagrams and mathematics goes too far. At pivotal points in the argument (for example, the explanation of circular flow) simple diagrams would have helped and not hindered even non-mathematical readers. Invoking Achilles and the Tortoise to explain the Multiplier surprised this reviewer, who discovered years ago that even mathematically backward schoolboys comprehended Zeno's Problems more easily through simple technique than by intuition. Shackle himself admits defeat at one point: explaining simultaneous equations (unfortunately with an example not directly applicable to the topic).

But this mote-seeking is unfair to a book which can (as the author hoped) be read for general interest and should be a valuable aid to first year university studies.

WILFRED T. DOWSETT

University of Western Australia.

A General Theory of the Price Level, Output, Income Distribution and Economic Growth. By SIDNEY WEINTRAUB. (Chilton, Philadelphia, 1959.) Pp. vii + 123. $3.50.

This book is as pretentious as its title. According to the blurb, it represents a "sensational break-through for the economics of price theory . . . that makes economics a predictive science". In fact, it consists of little more than a demonstration that the annual salary and wage bill of the United States has remained a fairly constant proportion of gross business product during the last thirty years. This "constant" is termed "the magic k" and treated almost like the force of gravity for the rest of the book, although it would be truer to say that the ratio has shown a fairly steady rising trend—from about 46 per cent in 1929 to 54 per cent in 1957.

Having satisfied himself of the constancy of average mark-ups, Weintraub advances what he apparently considers a novel hypothesis, viz. that the price level will rise only if unit wage costs rise. A great fuss is made over the close correlation between prices and unit wage costs, although this simply reflects slowly changing mark-ups. If Weintraub were correct in assuming a constant mark-up, the correlation would, of course, be perfect! As the book proceeds, still stranger things emerge, *e.g.* "criss-cross charts", which the author claims show that there is order in the "crazy complex" of industry mark-ups. This may well be true, but the charts suggest exactly the opposite.

The book is written in an infuriatingly "bitsy" style and so loosely that one wonders whether it is aimed at economists at all. For example, Weintraub analyses the price level into three variables, proceeds to measure each, then multiplies them together and compares the result with the actual price level. Some pages are devoted to expressing satisfaction that the results "check out" so well when in fact the only divergences arise from using two different series for the same thing! At least one misprint occurs, namely on page 36, where, under the sub-title of "A Curiosum", the 1940's are obviously meant instead of the 1930's.

Although it cannot be pretended that this is a good book, it is certainly stimulating—at least of irritation.

JAMES W. ROWE

Victoria University of Wellington.

The Failure of the "New Economics". An Analysis of the Keynesian Fallacies. By HENRY HAZLITT. (D. Van Nostrand, London, 1959.) Pp. xii + 458.

The failure which this author convincingly demonstrates is above all his own. Since Keynes wrote *The General Theory* much has happened to make available to economists efficient techniques of analysing multi-variate time series, of testing hypotheses, of sampling and subjecting social phenomena to measures of probability. All these developments seem to have passed the author by. What he says about demand

curves, about measuring elasticities, multipliers and the like, merely reflects the sorry state of the teaching of economics which still permits hordes of students to remain in medieval ignorance with regard to the rudiments of scientific inference.

There are available today efficient methods for laying bare the skeletons of economic theories and for showing that different doctrines are frequently homologous structures even when, at first sight, they appear to be at variance with one another. R. G. D. Allen has recently written a magnificent survey of such procedures. By such means the author might have hoped to produce a transparent and convincing demonstration of how surprisingly little is left today of the Keynesian world, and how much of it was neither so new nor so startling as it may have appeared in the 'thirties.

Instead, he flattered himself that he could turn mathematical purblindness into a virtue. Naturally he succeeded merely in demonstrating once more that the verbal dialectics of Raymundus Lullus cannot possibly unravel the intricate network of relationships which an economic system normally presents—even when this ancient method is handled by so cocksure a writer as Mr. Henry Hazlitt. One sympathetically agrees when, after the frustrating labour of writing this scholastic commentary on *The General Theory*, he felt that "the argument has taken a winding course, often involving repetition".

It is a pity, because the author certainly writes in a vigorous, somewhat sardonic, style of his own. In the school of H. L. Mencken he has learned how to deliver rough stuff, and L. von Mises has assisted in the drafting. Some mordant asides recall Groucho Marx at his best. However, the joys of pamphleteering rarely advance knowledge. And having deliberately elected to remain disgracefully benighted in technical aspects of scientific reasoning, the author is apt to light his rockets at the wrong end. Thus the audience, instead of being treated to some really illuminating fireworks, is merely smothered by stifling clouds of acrid dust.

H. Bernardelli

University of Otago.

An Introduction to Mathematics for Students of Economics. By J. Parry Lewis. (Macmillan, London, 1959.) Pp. x + 394. 60/- Aust.

The need for some mathematical knowledge is probably being felt by an increasing number of economists and students, if only because of the greater use of mathematics in recent books and periodicals devoted to economics. In response to this need there have been published during the past few years several books related to mathematical economics including: Henderson and Quandt, *Microeconomic Theory : A Mathematical Approach*; Allen, *Mathematical Economics*; Daus and Whyburn, *Introduction to Mathematical Analysis with Applications to Problems of Economics*; Bushaw and Clower, *Intro-*

duction to Mathematical Economics; and a second edition of Baumol, *Economic Dynamics*. And now we have J. Parry Lewis's *Introduction*.

The first two sections (pp. 100) of this book contain a revision of those parts of elementary algebra, trigonometry, and co-ordinate geometry which are more particularly relevant to economics. In the next two sections (pp. 160) the calculus is developed, and in the concluding section (pp. 63) difference and differential equations are treated. There are several appendices (the most important being on determinants) and a short bibliography. Economic examples are used to illustrate the mathematics, particularly in the sections on calculus and difference equations.

Readers of R. G. D. Allen's lucid *Mathematical Analysis for Economists* (1938) will appreciate that the ground covered by the book under review is roughly similar to that of Allen's. In the opinion of this reviewer, the earlier work is to be preferred for its exhaustive treatment, mathematical rigour, literary elegance, and choice of economic examples. J. Parry Lewis's book, nevertheless, fills the gap the author intended it to, that is, to cater for readers who are equipped with little, if any, mathematics by starting at a very simple level and slowly proceeding to more difficult and important work. Such readers after having completed this book could then turn with confidence to Allen's two books, reading them in the order in which they were written, after which they should have little trouble with most of the mathematical articles in the economic periodicals.

A. D. BROWNLIE

University of Auckland.

Interindustry Economics. By HOLLIS B. CHENERY and PAUL G. CLARK. (John Wiley, New York, 1959.) Pp. xv + 345. $7.95.

This is about the best expository work on economics I have ever read. How many others attempt, let alone succeed, as this one does, in combining a concise yet clear account of basic theory and computing methods, a comprehensive survey of applications, and the use of such a survey to illumine current and future research?

After an admirable introductory chapter sketching the development of interindustry analysis and its connections with both partial and aggregative analysis, the authors proceed, in Part I, to set out the theory and to scrutinise its assumptions. Transactions matrices and the basic Leontieff model are clearly set out in Ch. 2, as are the Gauss-Seidel[1] iterative and the matrix inverse solutions. Ch. 3 then develops the model so as to give estimates of the repercussions of final demand upon primary factors, and of wages or profit margins on prices. It also shows how the model can explain income-generation[2] if consumption is treated as endogenous, how it

1. Table 2.7 has two errors; column (8) should have the heading "1-a$_{ii}$", and the third entry in column (9) should be 250·7.
2. In Table 3.4 "Secondary Production" should be "Other Production".

may yield an interregional analysis[3] if aggregates are decomposed by regions as well as by commodities, and how attempts have been made to make the model dynamic by adding a sector for capacity building and adopting a crude acceleration principle.

Ch. 4 provides a remarkably good exposition of linear programming applied to the selection of optimum combinations of outputs or primary inputs. These two problems of choice are well illustrated by graphical analyses before applying the simplex method, improved by using "shadow" prices to evaluate profitability of excluded activities at each stage. I am particularly grateful for this excellent chapter.

The two concluding chapters of Part I helpfully discuss the practical construction of transactions and coefficient matrices, and empirical testing of input-output assumptions. Difficulties are not only exposed but guidance is given for meeting them, mainly by making the approach more flexible.

Part II surveys practical work in a number of countries. In chapter 7 there is an interesting summary of input-output tables in fifteen countries, and the four most reliable of these are used, in chapter 8, to examine the degree to which production is indirect and has a common pattern. It appears that input coefficients are remarkably similar, between countries, in manufacturing sectors, and that there is a sufficient lack of circular dependence between sectors to make Gauss-Seidel iteration an efficient method of solution if sectors are suitably ordered.

Some structural analyses are explained in chapter 9; in particular, the model used to estimate repercussions of U.S. military contracts upon the Italian economy, and Leontieff's analysis of factor contents of American exports and import substitutes, together with a summary of the discussions that followed his disturbing findings. In chapter 10 projections of economic structure are illustrated by Italian data, for which Chenery himself had much responsibility, and by the U.S. "emergency model" which seems to have been the last official use made of the massive Bureau of Labour study before this was, most unfortunately, closed down. Chapter 11 discusses a mixture of input-output analysis with linear programming to decide resource allocation in development plans, illustrated by a field study for Italy. Italian data are also used, in chapter 12, to give a practical illustration, along with three others, of interregional analysis.

The final chapter on the future of interindustry analysis points out the contrast between recent improvements in data and methods and the lag in practical applications, suggesting ways of improving this situation. No better contribution could, at the moment, be made than the publication of this book itself. It should do much to improve

3. In Table 3.7 the matrix used to obtain the consolidated coefficients is not the matrix of Table 3.4 but

$$\begin{matrix} 1{\cdot}0 & -0{\cdot}5 & -0{\cdot}4 \\ -0{\cdot}25 & 1{\cdot}0 & -0{\cdot}4 \\ -0{\cdot}75 & -0{\cdot}5 & 1{\cdot}0 \end{matrix}$$

the training of students in this important field, give valuable guidance to those already engaged in it, and perhaps even open the eyes of officials and business-men to the potentialities of interindustry analysis.

C. G. F. SIMKIN

University of Auckland.

Business Behavior Value and Growth. By W. J. BAUMOL. (Macmillan, New York, 1959.) Pp. 164. $4.75.

The purpose of this book is to put forward and to pursue the implications of two propositions. These are:

(1) That the American business-man does not plan his activities so as to earn the greatest profit. Rather he tries to maximize the total revenue of his firm, subject only to a minimum profit rate constraint.

(2) That after relatively few years the initial stock of capital in any region retains only a negligible influence upon the level of development attained. Much more important is the degree to which the general economic climate favours or inhibits internally generated expansion. The corollary follows at once. Economic aid to underdeveloped territories should not be confined to the mere gift of capital stock, but should be designed to create conditions which will increase the rate of self-sustained growth.

In his preface Prof. Baumol warns us not to expect a treatise, remarking that "no attempt has been made to offer a well-rounded discussion of any of the subjects introduced". The temptation to condemn the book as scrappy has therefore been resisted. On the other hand, it is fair to complain that the pages under review are likely to raise more questions in the mind of the reader than they clear up.

Not the least of the unanswered questions will be recognized as an old friend. If proposition (1) above is accepted, why should apparently rational human beings act deliberately against their own interests (and everyone else's) even when they have an industrial consultant with Prof. Baumol's understanding of the issues to advise them of the consequences of their actions? Again, proposition (1) does detach the minimum rate of profit from everything except its own bootstraps, despite Prof. Baumol's attempt to explain it in terms of the cost of borrowing (p. 51).

In Part II of the book, proposition (2) is made with great emphasis. The argument leads to practical proposals which merit consideration; in particular, there is a novel suggestion that tax rebates should be allowed to enterprises in proportion to their rate of growth. The theoretical work of this section is, however, very one-sided and unsatisfactory, largely owing to the author's preoccupation with his central theme. This leads him to overlook the fact that an

initial gift of capital stock might well be the most crucial factor in creating a positive self-sustained rate of growth. Indeed, it is easy to construct a model no less plausible than Prof. Baumol's, which is unstable and in which an initial gift of capital may lift the economy from a point which is unstable downward to one which is unstable upward. If, as is sometimes alleged, there exist underdeveloped regions whose real income per head is falling, it may be that the unstable model is the more realistic in important cases.

I. F. PEARCE

Australian National University.

Monopoly in Economics and Law. By DONALD DEWEY. (Rand McNally, Chicago, 1959.) Pp. 328. $5.75.

This work is described as "a small treatise"—a systematic account of what economists and lawyers have thought about the subject since it first received serious attention in its own right. Perhaps this is rather a highbrow term for a book which inspection shows to be something between a survey and an undergraduate text-book. At any rate, it fills a gap: there is no systematic exposition of this specialist field other than E. A. G. Robinson's well-known, but rather dated and elementary volume on *Monopoly* in the Cambridge Economic Handbook series.

The author is an economist "with a smattering of law" picked up in association with lawyers. Oddly, his legal chapters are more satisfying than his economic section. True, they are based mainly on U.S.A. experience. But they do provide a structure showing the Common Law background, the particular branches dealing with cartels, with mergers, the practices of so-called unfair competition, etc., in such a manner as to give the economist an adequate legal grounding in this field. Only minor reorientation is needed to make them apply to conditions in most English-speaking countries. The chapter on the development of monopoly policy in Britain has one or two defects. It is already rendered obsolete by the near-revolutionary pronouncements of the Restrictive Practices Court over the year 1959. Also, the author, one suspects, is insular in his attitudes: he doesn't sufficiently appreciate that, in contrast with the U.S.A., British and European governments, with their highly concentrated industrial structures within relatively small economies, cannot afford the luxury of all-out trust-busting. This doesn't mean small economies should avoid legislative action; the restrictive practices field especially provides good hunting for all. But it may be good policy to try and live with big business through the exercise of discreet control or surveillance. The original 1948 Act in Britain contains the essential elements of this approach.

The economic chapters give an adequate survey of the field; and the treatment of cartel and merger theory usefully fills a gap. But in the task of relating basic theoretical contributions to monopoly the standard becomes uneven. He is unconvincing in his assessment

of the welfare economics contributions. It is not clear that the role of welfare theory is properly understood. On monopolistic and imperfect competition the performance is better; the author cuts through some confusing theorems propagated by the school of imperfect competition to find the points of substance. But all of this subject—the theoretical basis of monopoly—requires a more integrated, specialist effort than can be provided in a survey of this character. Altogether one is left with the feeling that the author's strong suit is in commonsense judgments of *ad hoc* monopoly policies rather than in theory. This estimate finds confirmation in his own declaration in the preface that his "political convictions are those of the bourgeois liberal who esteems Frank Knight as the best of economists". It is rare to find an author's standards so unambiguously defined.

ALEX HUNTER

University of Melbourne.

The Motor Industry. (Cambridge Studies in Industry.) By GEORGE MAXCY and AUBREY SILBERSTON. (Allen & Unwin, London, 1959.) Pp. 245. 25/- stg.

The emphasis of this work is on analysis of the cost structure and its bearing on the nature of competition in the industry. It is a professional performance of a standard which makes reviewing a pleasure.

The first important element of the cost analysis is revealed in the rather surprising fact that the capital-output ratio of the motor industry is slightly lower than the average for manufactures (2·1 as against 2·2 average, and much less than, *e.g.*, 7·9 for oil refining). Before 1919 the ratio was above average, but has been declining ever since. Ford's flow-production innovation is apparently an example of a capital-saving invention. Thus the industry's fixed costs, although in absolute terms large, are in relative terms not extraordinary. Indeed, with fixed costs around 15% a rise in variable costs—materials and wages mainly—at "going volumes" is a much more serious affair than any increase in the costs of tooling, developing, etc. It follows that total unit costs are relatively constant over very large ranges of output (for a given plant). A 25% variation from "standard volume" in either direction yields only variations of 4-6% in unit costs.

The second major contribution in costs analysis gives substance to that almost mythological concept of Cambridge economics—the optimum size of firm. By means of international comparisons, which means leaning heavily on United States experience, an optimum output for each of four stages of the industry is deduced. Assembly and foundry work quickly reach an optimum at 100,000 units per annum; the machining of engines requires a much larger 500,000 units; and the pressing of body panels reaches its best output at one million per annum. However, the press shop is not too important in total

costs; and most economies of scale can be secured at the half-million mark. This may suggest that the British Motor Corporation, the largest firm, is close to the optimum. But the optimum figures assume identical or near-identical models; and few B.M.C. models exceed 100,000 volume. Thus the "big five" of the British industry compare badly with the "big three" of the United States which reach the one million mark with a number of models. Also, in Europe, Volkswagen is well ahead with close on half a million of one model. The lessons for British industry are: a further reduction in the range of sizes offered in the car market; a serious attempt to retain models for larger periods (to spread overheads); and more mergers among the moderate-sized firms. The price of greater efficiency appears to be further concentration of an already oligopolised market. But given the nature of competition in the industry the authors are not disturbed by this prospect.

The third important element in the cost analysis is the plausible realization of another highly elusive concept—the long-run average cost curve of a firm. The following relevant points emerge. There are sharply decreasing costs as output rises from low levels: a 40% reduction in moving from 1,000-50,000 units per annum, and a 15% reduction for 50,000-100,000 units per annum. Beyond the 100,000 figure the gains become moderate. The move to 200,000 yields a 10% reduction; a jump to 400,000 gives another 5%; and then savings tail off towards the one million mark. The exercise assumes a fairly high degree of integration between models, components, etc. Thus for the majority of firms a move beyond 100,000 units per annum does *not* bring the enormous economies of scale which popular opinion ascribes to this industry. Prospective gains of 10-15% can be regarded as little more than reasonable cover against error. On the other hand, these are figures for a "product-mix" of cars, vans, utilities and lorries. For the firm which has the strength of will to confine itself to one basic model, the returns are inevitably much greater. But in most countries other than the U.S.A. and U.S.S.R., market opportunities militate against this policy except for the occasional firm with an exceptionally successful car. A popular model based on well-organized mergers would nowadays appear to provide the key to the automotive kingdom. Another item of interest which emerges from this admirable exercise is that there appears no good reason why the long-run cost curve should begin to rise. Even at one million units per annum moderate progress in technology and organization would be sufficient to prevent this contingency.

The chapters on competition in the industry are equally interesting. Briefly, although the constant costs bias and the concentration of the industry combine to force price-rigidity, examination reveals a fierce enough competition over the long period. It takes the form of "model-price" competition: that is, the designing and building of models which are better than those produced by competitors but sell in the same price group. Efficiency and competitiveness is then

reflected "either in models which give better value for money or in bigger profit margins or possibly in both, rather than in lower prices". Thus, in spite of its oligopolistic structure there is no evidence of agreement, tacit or formal, except in the matter of avoiding direct price-competition. It may seem as though the term "efficiency" is here specially interpreted to suit the character of the competition. But the study shows, Schumpeter-wise, that the progress of real costs over time, technical progress, comparative costs and the ability to survive in an international market are proof enough of the efficiency of the industry.

Not all questions are comprehensively covered in this study. For example the chapters on growth are orthodox—the pre-1914 industry, the economic consequences of Henry Ford, mergers, finance of development, and all that. But a large proportion of the hypotheses fundamental to the theory of the firm receive treatment which render them intelligible to the student and, at the same time, advance our knowledge of industry.

ALEX HUNTER

University of Melbourne.

The Growth of British Industrial Relations. By E. H. PHELPS BROWN. (Macmillan, London, 1959.) Pp. xxxvii + 414. 62/- Aust.

Although this work is centred on the circumstances of 1906-14, a period marked by bitter, prolonged and frequent strikes as well as significant political and social changes, it is essentially an attempt to throw light on the origin and development of British industrial relations. Why did industrial strife on this scale take place at all, and why in this period? Why did the much-feared industrial revolt not take place? How do we account for certain peculiar characteristics of British industrial relations—the structure of unionism and employers' associations; industry-wide bargaining, the nature of government intervention; the nature of collective agreements, etc.? These are some of the main questions with which the book is concerned.

A particularly valuable feature of the book is that before answering these questions, the author discusses at some length the social and institutional circumstances of the period, with a look at the years before and after. By posing the problems in the full context of their relevant environmental factors, Professor Phelps Brown has given us what is undoubtedly one of the more balanced, more integrated and more interesting appraisals of British industrial relations over a critical period of their development.

Chapter I, "The Condition of the People", deals with demographic factors, the standard of living, income distribution, health and recreation. Chapter II is concerned with conditions of work and worker-employer relations—the workplace, technology, management and unemployment. Chapter III is called "The Development of Industrial Relations" and it discusses mainly the institutional frame-

work of industrial relations—the nature and extent of unionism, the nature of collective bargaining, conciliation and arbitration machinery and the sources and centres of conflict. Chapters IV and V elaborate on two institutional matters—the development of public policy in relation to disputes and their settlement; and union structure and government, and their relationship to collective bargaining. The last two chapters deal more specifically with the questions mentioned above.

Since many of the issues discussed in the context of 1906-14 are still alive today, although perhaps somewhat modified by altered circumstances, this book will be welcomed not only by students of social history but also by those interested in current problems of industrial relations.

To the Australian reader, two questions in particular arise for comment. First, why did the course of public policy and public action on the settlement of industrial disputes take a different turn in Australia when, in so many ways, the circumstances of Australian industrial relations during 1880 and 1900 were similar to those prevailing in Britain during the period discussed in this book? In explaining the "British tradition", Phelps Brown says:

> "The categories of the law are not readily applicable to spontaneous partial groupings in defence of particular common interests. Its sanctions are hard to apply to tens of thousands of men at once, and were they applicable would still create no willingness to work on terms regarded as unfair. But it is on willingness that good industrial relations depend: if employers and employed are decent and reasonable there will be little trouble, and if they are not Acts of Parliament will not make them so." (P. 358)

Why should this not apply to Australia? True, Australian unionism had suffered a grievous defeat in the 1890's. Even if this could explain unionism's initial support for compulsory arbitration immediately following its defeat, why should it explain its support by 1905 or even 1910, since compulsory arbitration had not yet become ingrained in the system? Is it indicative of the Australian's more ready acceptance of government intervention, or is it the basic wage idea to which compulsory arbitration gave birth? Or was it just an accident? This is an interesting problem and one which deserves a more careful enquiry along the lines of Phelps Brown's book.

The second matter concerns the effects of industry-wide bargaining in Britain. First, it left a gap in the relationship between the employer and his worker at the plant level which joint consultation has not really succeeded in bridging. Second, Phelps Brown points out that industry-wide bargaining "has concentrated wage negotiation on a point where little can be done to raise real wages" (p. 364). Both observations apply even more strongly to the Australian method of wage adjustments on a national scale through the

arbitration system. True, there exists the practice of over-award payments negotiated between union and the individual employer on a *quid pro quo* basis. Experience shows, however, that these over-award payments tend to provide the basis for a general wage increase with dangers to price stability.

Phelps Brown concludes that there is the opportunity and the need in Britain for further development of employer-union relationship on a plant basis along American lines. "As one lifts one's eyes from past to future, it seems that in Britain the greatest scope for the development of industrial relations is here. These relations matter most to men when they run between those who work together in the same place. It is only through the understandings developed there that the two sides can approach a working partnership." (P. 367)

The same may be said for Australia. The big question, however, is whether such a modification in employer-union relationship, if pressed too quickly, may not place an undue strain on a well-established and highly-centralized union structure. The American system developed in the first place not from any real appreciation of the advantages of local bargaining but from both the greater size of plants and the greater importance of geographical dispersion.

A full chapter-by-chapter synopsis, biographical notes, and an appendix on sources are extremely useful features of the book. And of course Professor Phelps Brown writes in that lucid and imperturbable prose which is always a pleasure to read.

J. E. Isaac

University of Melbourne.

The Social Evolution of Industrial Britain—a study in the growth of our industrial society. By L. G. Johnson. (Liverpool University Press, 1959.) Pp. viii + 171. 25/- stg.

This is a stimulating and well-written book deserving of a longer notice and a wide public. Its purpose is to explain the evolution of a specific industrial society, Great Britain; its method, to re-interpret old facts rather than establish new ones, for there are few indeed which are not well known to the social historian of nineteenth and twentieth century Britain. Nevertheless, its theme is clear and challenging.

The early decades of the nineteenth century saw the emergence of a "new people", a new species of labourer whose function was to provide the skill to operate the machines invading the manufacturing processes and who collectively became known as "the working class". This development called for a redefinition of social arrangements, but it was not an easy task as the social implications of technological progress were not fully understood. Moreover, recurrent unemployment and social degradation resulting from an iniquitous poor law arrayed the working class against such progress, while governments were too occupied with preserving constitutions rather than with discovering new techniques by means of which the con-

stitution could work within a novel environment. Yet the working class "had to get used to the consequences of a mechanical revolution" and they sought to adapt old working class institutions and develop new ones in order to satisfy their needs. Self-education, the growth of savings banks, benefit societies, building societies, co-operative societies and trades unions called for a creativity from working men which endowed their lives with a new order and discipline. This new pattern of life impressed itself on the rest of society and at the same time presented it with a challenge. No longer were the old restraints necessary, and from the late eighteen sixties they were steadily withdrawn. The working class were incorporated within the political scheme of things, relationships between employer and employee were redefined, and education facilities were widened. Despite these advances, social integration was in no way complete. In the last two decades of the nineteenth century, when the old foundations of British prosperity were being eroded by the competitive power of other nations, still newer significances began to emerge which called for still closer definition of social relationships. An increasing awareness of poverty and a realization that recurrent, and at times as good as permanent, unemployment was nothing less than tragic economic waste, gave to trades unions, as defenders of Labour's interests, a new place in society and helped establish a new form of socialist doctrine. The Labour question dominated all others. It was left to the twentieth century to attempt a solution by moving "towards a society of working people".

A short summary such as this is bound in a measure to distort some of the argument, but it is hoped that no marked injustice is being done when it is suggested that the narrow postulates on which the argument rests provides too limited a perspective of the social evolution of industrial Britain. It may be true—it undoubtedly is—that the working class emerged with the industrial revolution. It may be true—it undoubtedly was—that there was the problem of integrating the working class into the social framework; but these are not the whole story of the evolution of a society, nor for that matter the most important part. Equally significant was the emergence of the middle class who provided the executive capacities for organizing and developing industrial Britain. And of importance, too, was their social integration. Moreover, if the author had begun from the postulate that his "new people" was the middle class, a significantly different story would no doubt have emerged, but it also would have suffered from too narrow a perspective. In addition, social growth involves "social death". Part of the evolution of a society must be the decay of redundant social groupings. Was there an "agony of the gentry"? How did the aristocracy adapt themselves to the new industrialism? Indeed, the evolution of a society, no matter whether it be pre-industrial, or industrial, or in the period of "take-off", is more complex than the story as seen from the viewpoint of one class may suggest.

More can be said but space forbids. Yet despite these points of criticism the book is very worth while reading. Economists, sociologists, historians, will all gain from it not only because it forces a re-examination of the general notions of social change, but also because the author writes excellent English and deals with human behaviour in a human way.

J. GINSWICK

University of Sydney.

Robert Torrens and the Evolution of Classical Economics. By LIONEL ROBBINS. (Macmillan, London, 1958.) Pp. xiv + 367. 56/6 Aust.

Robert Torrens played an active and in many ways important part in the development of English economic thought during the first half of the nineteenth century; an account of his life and work must help to bring out the vigour and excitement of years which were once described as "the richest period" in the history of our science. In addition, because of his contributions to the theory of colonization and his intellectual association with E. G. Wakefield, the writing of this one-time chairman of the South Australia Commissioners must have a special interest for Australians. We should be grateful to Professor Robbins for this study, which tempers scholarship with deftness of touch, and gives a clear analysis of Torrens' ideas against the wider backcloth of Classical Economics.

After a short biographical summary, Professor Robbins divides his book into four main sections, dealing in turn with Torrens's contributions to central Classical Theory (production, the gain from trade, distribution and value), the theory of money and banking, the theory of colonization and the theory of commercial policy. There is also an extensive bibliographical appendix listing Torrens's many writings in the half-century 1808-1858, and giving in each case a brief but very useful discussion of contents. There must be a natural temptation for an historian of economic thought to play up the importance of an author whose work he has read exhaustively and with particular interest. In his summing up, Professor Robbins has avoided this bias; his assessment of Torrens' place in the development of economic ideas is balanced and, if anything, conservative in nature. But this does not make for dull reading; on the contrary, the book is enlivened throughout by the challenge which Professor Robbins so obviously found in his investigation of Torrens' complex character as a theorist.

In the history of economic thought we have too many general text-books which begin in the Stone Age and work their way forward, saying a little about every major thinker's view on every subject. These often show a depressing similarity of design and conception, and there is a tendency to assume zero knowledge on the part of the reader. We have too few monographs dealing with special persons, periods or problems, written for fellow historians or serious students who can be relied upon to make some effort to follow an argument.

By his example, both in *The Theory of Economic Policy* and *Robert Torrens,* Professor Robbins has done much to mark out the path that we should be following.

G. S. L. TUCKER

University of Melbourne.

Dynamic Changes of Income and its Distribution in Japan. By CHOTARO TAKAHASHI AND OTHERS. (Kinokuniya Bookstore, Tokyo, 1959.) Pp. vii + 183. Price not stated.

All the customary measures of the equality of incomes are weakened by their lack of sensitivity. Income distributions must differ quite markedly before the relative degrees of equality can be separated by the pictorial methods of Lorenz, Pareto and Gini. The same characteristic weakens the numerical presentation of these indicators. Even where they do distinguish between distributions, much care is often required before the investigator may suppose that one is more equal than another.

Prof. Takahashi attempts to overcome the difficulties of sensitivity and interpretation by avoiding the usual techniques. Instead, he uses statistics describing frequency distributions—means, standard deviations, and coefficients of variance—to annotate changes in the distribution of incomes in Japan. Because these distributions closely approximate logarithmic normality, the author finds that slightly better results are achieved with logarithms of the natural data. Over short periods the means are sufficiently stable to permit the use of the coefficient of variance as a measure of equality. To provide confirmation of results and interpretations, considerable use has been made of Gibrat's coefficient.

The statistical description of changes in Japanese income distributions over half a century occupies must of the book. Unfortunately the main source of information is the income-tax statistics which, especially in the early part of the period, account for higher incomes only. For the post-war years such supplementary sources as expenditure studies and welfare statistics are available.

Little that is new has been found relating to the general level of incomes which, with few exceptions, seem to move approximately according to expectations. However, the changes in income levels have been analysed by occupations for both persons and corporations. The occupational analysis will be of considerable interest in countries where efforts are being made to increase exports to Japan.

W. A. POOLE

University of Otago.

Financing of Economic Activity in Canada. By WILLIAM C. HOOD. (Royal Commission on Canada's Economic Prospects, Toronto, 1958.) Pp. xv + 700. Price not stated.

In the context of the sponsorship of this book, namely the Royal Commission on Canada's Economic Prospects, the title of this book,

at least for non-Canadian readers, is somewhat misleading. Simply to have added in brackets 1946 to 1956 would have helped to clear up this ambiguity, for the book is primarily a study of the recent past rather than a forecast of future financial requirements. It is only in the sense that morals are drawn from this experience that it is a guide to the future.

As a survey of the financial processes in post-war Canada this is an extremely useful work. One major section attempts to provide an integrated picture of the course and interrelationship of financial flows during the period 1946 to 1956. Subsequent chapters examine in more detail consumer finance, business finance, financial intermediaries and the banking system. For varying reasons government finance and foreign investment are not given separate detailed treatment, so that the study is essentially one of the structure of the private domestic capital market and of the efficiency with which it performs its functions.

The main feature of technical interest is the presentation of a set of national transactions accounts for Canada 1946-54. These are an extension of the normal national accounts aimed at measuring the financial flows which lie behind the national income aggregates of savings and investment. Over one-third of the book is devoted to a discussion of the methods employed in the preparation of these accounts and to the presentation of detailed tables.

As the authors of this section—L. M. Read, S. J. Handfield-Jones and F. W. Emmerson—freely admit, some heroic assumptions on occasion have to be made in order to present existing data in the form required by the accounts, and in places there are large residual errors and omissions. Nevertheless, the aid which such accounts give to the presentation of an integrated analysis of financial flows—as is illustrated in the overall survey in the main text—is such that, given intelligent use of the figures, they provide a major addition to national income accounting analysis. It is only to be hoped that the Australian work which has been done in this field—which must necessarily suffer from the same sort of inadequacies as does this Canadian study—will be published before long. When it is, the comparison of Canadian and Australian experience of what have been essentially the same financial pressures will indeed be illuminating.

A. R. HALL

Australian National University.

International Trade 1957-58. (Sixth Annual Report prepared by the GATT Secretariat.) (Contracting Parties to the General Agreement on Tariffs and Trade, Geneva, July, 1959.) Pp. 318. $2.00.

These reports have long ceased to be merely progress reports on the work of the GATT, and, like its predecessors, this one contains much useful information, completely analysed. It amply illustrates, in each of its three parts, the difficulties facing countries such as Australia in the marketing of their primary product exports.

Part I surveys recent developments in international trade. The trade recession of 1957-58 it attributes largely to unsettled economic conditions, especially in North America, and the slackening of economic growth elsewhere. It notes, however, that exports from industrial countries were generally well maintained, but that exports from non-industrial countries continued to decline as a proportion of world trade. Significantly, "Australia was one of the non-industrial countries most seriously affected by the trade recession" (p. 162).

The report comments at length, with ample support from tables, on developments in trade in manufacturing and primary products, on trade between industrial and primary producing areas, trade in sheltered, as distinct from normally competitive channels, and upon trade in particular commodities and by particular countries. A comprehensive survey of trends in trade between Communist and non-Communist countries ends this part.

Recent developments in commercial policy are examined in Part II. The picture, from the GATT viewpoint, is not particularly bright. Though tariff reductions were many, so were tariff increases. Moreover, despite the improvement in the financial position of the industrial countries, " . . . there remains a substantial area of import restrictions applied . . . for reasons which are not associated with balance of payments situation(s)" (p. 254). Many of these restrictions, the report adds, are in the agricultural sector.

Part III summarizes the work of GATT during the twelve months to June, 1959. Particularly interesting to Australia is the programme for the expansion of international trade (pp. 289-292). Of the three committees established to study the implementation of this programme, the second, dealing with agricultural protection, is potentially of considerable significance to Australia. Interesting, also, are the sections on regional integration, the waiver granted to Germany, and Australia's complaint regarding French assistance to wheat and flour exports.

For those interested in Australia's overseas trading problems, this report usefully supplements the Experts' report to GATT, *Trends in International Trade*. It provides a valuable background to any consideration of Australia's trade policy and export prospects, and should further discourage the view that increased production is the simple answer to the problem of increasing exports.

S. HARRIS

Australian National University.

Output, Employment, Capital and Growth. By HANS BREMS. (Harper & Brothers, New York, 1959.) Pp. xiii + 349.

This is a difficult book to review. It comprises an attempt "to restate and occasionally to refine and extend modern and neoclassical models of output, employment, capital and growth", and is divided into four parts. Part I, "The Keynesian Model", presents the Keynes-

ian theory, expanded to cover the case of two countries. In Part II, "Disaggregation of the Keynesian Model", the model is further expanded by the differentiation of three sectors in the economy (firms, households and government), and the explicit introduction of the prices of goods and factors. This enables an examination to be made of the effects of both price and fiscal policies upon the level of output; and there is also a chapter on the effects of non-price competition. The process of disaggregation is finally completed by two chapters on the Leontief "inter-industry" transactions model. Part III, "The Demand for Input", is concerned largely with the neoclassical theory of the firm, and the determination of wages, profit and rent, and includes a chapter on linear programming; and Part IV, "The Dynamization of the Keynesian Model", expands the growth models developed by Harrod, Domar and Cassel by the inclusion of technological progress and a foreign-trade accelerator, and analyses the stability of the equilibrium rate of growth. It is obvious that if all this is to be accomplished, a great deal of compression is inevitable: this is the disappointing feature of the book as a whole. Is it really possible, for instance, to cover the neoclassical theory of wages, capital and output in ten pages? With such a large programme to get through, Mr. Brems has not left himself time for much more than formal statements of his models in mathematical terms; and mathematics is not a genuine substitute for economics. One cannot help thinking at the end that the subject matter of each one of the four parts is worth a book in itself, and that a full discussion of the economic content of the models, and the problems which arise out of them, would have been much more satisfying.

Since such a wide range and variety of topics is considered, the book raises many issues, and practically every chapter is deserving of some comment. This is obviously an impossible task for a reviewer, but I should like briefly to discuss Mr. Brems's analysis of the Harrod growth model, since it leads him to the interesting and surprising conclusion that increasing the length of the time period will finally affect the instability of the equilibrium rate of growth of income.

In Chapter 20, Mr. Brems begins his exposition of Harrod's analysis with an arithmetic example, the assumptions of which are that $C(t) = aY(t)$, and $I(t) = b[Y(t) - Y(t-1)]$, so that the equilibrium rate of growth of income is $g = \frac{1-a}{a+b-1}$. This is the familiar unlagged version of the Harrod model. However, this form of the model is not adhered to in his algebraic exposition. The behaviour equation expressing consumption demand is there given as $C(t) = aY(t) + A(t)$, with the claim that "it is reasonable to assume that $A(t)$ rises at the same proportionate rate of growth as does equilibrium income". But what does this assumption mean? If, for instance, the actual rate of growth of income is not equal to the equilibrium rate, is it reasonable to assume that $A(t)$ will increase at the conceptual equilibrium rate? It would appear more reasonable

to assume that A(t) grows at the same rate as does actual income; but then the ratio between consumption and income remains constant, and there is nothing to be gained from the introduction of A(t) into the model. If Mr. Brems wants A(t) to increase at the same rate as does equilibrium income, regardless of the rate of growth of actual income, then he is really following Professor Hicks's treatment of autonomous investment, and assuming that A(t) grows at some given rate, g, independent of the growth rate of income. The equation for equilibrium income then becomes

$$Y(t) = aY(t) + b[Y(t) - Y(t-1)] + A(o)(1+g)^t,$$

the solution of which is $Y(t) = M\left[\frac{1-a}{a+b-1}\right]^t + RA(t)$, where $R = \frac{1+g}{(1-a)(1+g)-bg}$, and $M = Y(o) - RA(o)$. If it is desired to identify the equilibrium rate of growth with a constant rate of growth, the initial level of income must be chosen so that $Y(o) = RA(o)$, and the path of equilibrium income is given simply by $Y(t) = RA(t)$. Both the level and the rate of growth of equilibrium income are then determined by the level and the rate of growth of the autonomous term in the consumption function, not the other way round.

This point is crucial to Mr. Brems's later discussion in Chapter 25 of the stability of the equilibrium rate of growth. Harrod's equilibrium rate of growth is unstable because if the actual rate of growth exceeds the equilibrium rate, the demand for current output exceeds the supply of it, and *vice versa*. A further point that arises in his model is that since the time-path of equilibrium income is given by $Y(t) = Y(o)\left[\frac{b}{a+b-1}\right]^t$, then if $b < 1-a$, $\frac{b}{a+b-1}$ is negative, and equilibrium income will oscillate about a zero level of income. Since in any practical sense actual income can never be negative, the equilibrium growth rate only exists as long as $b > 1-a$. If $Y(o)$ is an initial equilibrium level of income, and $b < 1-a$, income can neither remain in equilibrium at the same level in the next period, nor change to any positive equilibrium level in the next period. $Y(1)$ is always unstable downwards.

This situation is relevant to the model because Harrod makes the point that as the unit time period is increased, the value of the capital coefficient is decreased, since income is output per unit period. On the assumption which he makes, that income per unit period is constant throughout any longer period considered (*i.e.* "income per annum is twelve times income per month"), the capital coefficient is inversely proportional to the time period. If, for instance, b is the capital coefficient appropriate to a time period t, and B the coefficient for a time period T, then if $T = 10t$, $B = \frac{b}{10}$. This means, then, that if the period over which entrepreneurs plan to alter output is in-

creased to the point where the capital coefficient becomes less than the average propensity to save, the equilibrium growth path disappears. The longer the planning period, the smaller is the desired ratio between capital and output, and the greater must be the rate of growth of income in order that desired investment be sufficient to fill the gap between output and consumption demand. If the planning period is continually increased, then eventually the desired ratio becomes so small that this condition can never be fulfilled.

One solution to this problem is to introduce a lag into the system. If either $S(t) = (1-a)Y(t-1)$, or $I(t) = K(t+1) - K(t)$, the equilibrium growth rate is $g = \frac{1-a}{b}$, and as b tends to zero, g tends to infinity, so that there is no worry about g becoming negative.

What Mr. Brems tries to do in Chapter 25 is to show that increasing the length of the time unit will finally change the time-path of equilibrium income from an unstable one to a stable one. Oddly enough, he deserts his mathematics at this point, and endeavours to establish this proposition only by means of arithmetic example. We are given no hint, for instance, of the critical value of the capital coefficient at which the equilibrium growth rate becomes stable. Certainly it seems worth while investigating what has been done to produce this result.

The first difficulty to be overcome is the fact we have already considered, that increasing the time period may finally reduce the value of the capital coefficient below that of the average propensity to save, so causing the equilibrium growth rate to become negative. Mr. Brems gets over this problem by rather peculiar means. In his example the time unit is increased from a year to a decade, but income is assumed still to increase within the decade at the equilibrium rate of growth, so that the value of the capital coefficient is not inversely proportional to the length of the time unit. If income throughout the decade grows at the annual equilibrium rate, the capital stock is increasing at the same rate; and Mr. Brems shows that in these circumstances, as the time unit is increased indefinitely, the value of the capital coefficient tends to the average propensity to save, and the equilibrium growth rate tends to infinity, as we have seen. But is this really a valid way of overcoming the problem? In this case the alteration to the time unit does not seem in any real sense to have altered the planning period, for if income within the decade continues to grow at the annual equilibrium rate of growth, then the planning period must still be a year. In his own analysis of the shift from an annual to a decade basis, Mr. Brems discusses what happens if for a decade "firms plan for current output to exceed current equilibrium output by one dollar per year". If they do this, they must obviously plan their investment on an annual basis. In the initial year of the decade the Harrod sort of instability will arise, and the shift from an annual to a decade basis has not

affected the consequences of deviations from the equilibrium path. Since Mr. Brems aims to prove that it does, he must find some other means, such as introducing lags into the system, of ensuring that the capital coefficient does not fall below the average propensity to save.

But this does not affect the main contention that reducing the value of the capital coefficient will finally make the equilibrium growth path a stable one. To consider this we must come back to the original assumption that the consumption function contains an autonomous term growing at a constant rate, which then determines the equilibrium growth rate of the system. This means that if the equilibrium growth rate is maintained, the ratio between $Y(t)$ and $A(t)$ is constant, and the average propensity to save is constant. But if the actual rate of growth of income differs from the equilibrium rate, the ratio between $Y(t)$ and $A(t)$ is not constant, and the average propensity to save will change. It is this which puts a brake on the instability of the equilibrium path. If entrepreneurs attempt to expand output at a rate faster than the equilibrium rate, the average propensity to save will rise, and the gap between output and demand will not be as great as it would have been in the ordinary Harrod model. Under what circumstances, then, will this braking effect be sufficiently effective, so that if the actual growth rate exceeds the equilibrium rate the demand for output will be less than current supply? It can be shown that, in Mr. Brems's model, this will occur if $b < 1 - a$, and Harrod's problem of instability disappears. If $b > 1 - a$, the model behaves as does the Harrod model; and if $be = 1 - a$, then if income is in equilibrium at $Y(o)$, *any* level of income in the next period will also be in equilibrium—though this is unfortunately not true also of the period after that! The difference between the stability of an equilibrium level of income, and the stability of an equilibrium rate of growth of income, must be kept constantly in mind. If $b < 1 - a$, and income is in equilibrium at $Y(o)$, then it is true that a departure in the next period from the equilibrium level of income for that period will tend to be reversed; but it is only if entrepreneurs in each period can revise their investment plans and adjust their output in the Keynesian manner that the equilibrium rate of growth of income will be preserved.

Since Mr. Brems is so concerned with the instability of Harrod's equilibrium rate of growth, it is surprising that he should fall into the error of claiming that the Harrod analysis "restores thriftiness to its former place of honour". This, he says, is because in the Keynesian theory an increase in the propensity to save reduces the equilibrium level of income, but in the Harrod model it increases the equilibrium rate of growth. This is surely a false contrast between the two models, because the same problem exists in each. In the Keynesian theory the equilibrium level of income is stable, but in Harrod's analysis the equilibrium rate of growth of income is unstable, and if an increase in thrift raises the equilibrium rate of

growth above the actual rate of growth, then saving is a force making for depression, exactly as in Keynes. It is the departure from the equilibrium rate of growth, and not the equilibrium rate of growth itself, which is important. Hence, I do not understand how this contrast between the two models "vividly illuminates the lack of generality and validity in the Keynesian model", as is claimed in the critique of Keynesian analysis in Chapter 6.

It is difficult to know whether Mr. Brems intended his book as a text to be used by students, or as a development of economic theory, though he does state that teachers considering its use in a graduate economic theory course would probably want to skip some of the later chapters. It is written at a high level of abstraction, and is certainly not an easy text; but the reader will find much that is stimulating and helpful, as long as he does not take it all on trust.

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BOOKS RECEIVED*

A.—AUSTRALIAN AND NEW ZEALAND PUBLICATIONS

FEDERAL CHAMBER OF AUTOMOTIVE INDUSTRIES. *Australian Automotive Yearbook 1959.* (Melbourne, 1959.) Pp. 120. No price stated.

This yearbook is the first of its kind published for the Australian industry. Essentially it is a collection of all the relevant statistics on the industry—outputs, imports and exports, tariffs, tares, transport regulations, road fatalities, registrations, etc. It also contains a few notes on the origins of individual manufacturers. It is a valuable reference work both for the industry and the road transport system.

B.—OTHER PUBLICATIONS

ABBOTT, J. C. *Marketing Problems and Improvement Programs.* (United Nations Food and Agriculture Organization, Rome, 1958.) Pp. 260. 12/6 stg.

This is the first in a new FAO series of marketing guides intended for businessmen and administrators. While some references are made to the wealthier nations, this monograph is basically meant to meet the needs of underdeveloped countries. As information about marketing problems and research from these areas is comparatively scarce, this publication fulfils a useful role. The main functions and problems of marketing organizations and the possibilities of introducing improvements are outlined, usually accompanied by concrete examples from a diverse collection of markets and countries.

AIROV, JOSEPH. *The Location of the Synthetic-Fiber Industry. A case Study in Regional Analysis.* (John Wiley, New York, 1959.) Pp. 203. $9.75.

Professor Airov outlines the development of the synthetic-fibre industry and then proceeds to derive production functions for the manufacture of chemical intermediates and synthetic fibres. After identifying the factors which determine the location of the industry, regions of minimum cost are calculated. Although chiefly concerned with the United States, the book also considers the establishment of a synthetic-fibre industry in Puerto Rico.

ALLEN, WILLIAM R., and ALLEN, CLARK LEE (eds.). *Foreign Trade and Finance, Essays in International Equilibrium and Adjustment.* (Macmillan, New York, 1959.) Pp. 500. $6.00.

This collection of recent essays by eminent economists is a most welcome supplement to the American Economic Association's *Readings in the Theory of International Trade.* Arranged in five sections, each with its own introductory commentary, the book deals first with the connection between international trade theory and policy issues before introducing a theoretical section on the post-war dollar problem. Section three examines the adjustment process and contrasts the price-specie-flow mechanism with the role of income changes developed from Keynesian theory. Part four reviews the theory of exchange rates where the price mechanism operates freely, and part five examines their determination where a substantial degree of exchange control is prevalent.

BANK FOR INTERNATIONAL SETTLEMENTS. *Twenty-ninth Annual Report.* (Basle, 1959.) Pp. 244. No price stated.

This gives the customary survey of world economic trends during the year, with special emphasis on Europe and on monetary matters. It provides the most authoritative source material about the operations of the European Payments Union (for which the B.I.S. was the agent) and of its winding-up and supersession by the European Monetary Agreement.

BATCHELOR, JAMES H. *Operations Research : An Annotated Bibliography.* 2nd ed. (Saint Louis University Press, 1959.) Pp. 866. $10.00.

This volume provides in conveniently accessible form a much-needed digest and index of the rapidly-growing world literature of operations research

* Acknowledgment of publications does not guarantee review.

to the end of 1957—some 6,000 entries in all. The references to original books and articles as well as to abstracts and comments are extensively indexed. The volume is thus a useful reference work for every scholar or professional analyst concerned in any phase of operations research.

BAUMOL, WILLIAM J. *Business Behavior, Value and Growth.* (Macmillan, New York, 1959.) Pp. 164. $4.75.

BRAZER, H. E. *City Expenditures in the United States.* (Occasional Paper 66.) (National Bureau of Economic Research, New York, 1959.) Pp. 82. $1.50.

This booklet provides a comprehensive statistical analysis of per capita local government expenditure in 462 United States cities.

Very substantial differences between cities according to the states and geographic regions in which they lie are disclosed for all the items of expenditure considered, including sanitation, police services, fire protection and recreation. The attempt is then made to estimate the extent of the relationship between these and a number of measurable "independent" variables. It is found that density and distribution of population (but *not* population size) together with median family income are significant determinants of per capita expenditure for most items. The results of a very formidable array of regression and analysis of variance studies are presented in great detail.

BREMS, HANS. *Output, Employment, Capital and Growth.* (Harper, New York, 1959.) Pp. 349.

BRITTAIN, SIR HERBERT. *The British Budgetary System.* (Allen & Unwin, London, 1959.) Pp. 320. 25/- stg.

This new work on the important and interesting topic of the budgetary system deals with the economic background as well as the Parliamentary setting and control of the Budget. There is a chapter on the general design of the Budget and a detailed examination of revenue and expenditure on both current and capital accounts. Other topics dealt with include the Issue Department, the Exchange Equalization Account, and the National Debt and its management.

BROWN, E. H. PHELPS. *The Growth of British Industrial Relations.* (Macmillan, London, 1959.) Pp. 414. 62/- Aust.

CHAMBERLAIN, JOHN. *The Roots of Capitalism.* (Van Nostrand, London, 1959.) Pp. 222. 41/6 stg.

This is a shallow essay in economic moralising, concerned with defending large-scale enterprise against the inroads of government. Its thesis is that most economists, including Keynes, Robinson, Chamberlin, Samuelson, Veblen, Weber, Tawney, *et al.*, have overlooked the economic benefits flowing from the activities of men like Eli Whitney, Fredrick Taylor and Henry Ford. As a result there have been iniquities such as the Sherman Act, the Clayton Act, the New Deal and national income accounting.

CHANDLER, LESTER V. *The Economics of Money and Banking.* (Harper, New York, 1959.) Pp. 549. $6.50.

This is an extensively revised edition of an introductory textbook in money and banking, remarkable for its clarity. It covers the institutional, historical and theoretical aspects of monetary economics, the material for which is well organized and presented in a stimulating fashion, the chapters on the United States banking system and its control being particularly good. Although written for the American undergraduate, this textbook can be confidently recommended for use by Australian students.

CHENERY, HOLLIS B., and CLARK, PAUL G. *Interindustry Economics.* (John Wiley, New York, 1959.) Pp. 345. $7.95.

CHOTARO TAKAHASHI. *Dynamic Changes of Income and Its Distribution in Japan.* (Kinokuniya Bookstore, Tokyo, 1959.) Pp. 182. Price not stated.

COTGROVE, STEPHEN F. *Technical Education and Social Change.* (Allen & Unwin, London, 1958.) Pp. 220. 25/- stg.

An excellent treatment of the social forces which have shaped the development of technical education in England and Wales since the early nineteenth century. In filling a gap in the history of the English system of technical education, this survey helps towards a better understanding of the

questions surrounding the present shortage in Britain of trained scientific manpower.

DEWEY, DONALD. *Monopoly in Economics and Law.* (Rand McNally, Chicago, 1959.) Pp. 328. $5.75.

EWING, A. C. *Second Thoughts in Moral Philosophy.* (Routledge & Kegan Paul, London, 1959.) Pp. 190. 21/- stg.

This is largely an amendment of the author's opinions, expressed in his earlier work *The Definition of Good* (1947). Dr. Ewing gives a brief account of three leading theories of ethics: naturalism, subjectivism and non-naturalism. Without abandoning the essential objectivism of his earlier book he is now more inclined towards a middle way between objectivism and subjectivism to which he devotes the second chapter of the book under review.

FITTON, R. S., and WADSWORTH, A. P. *The Strutts and the Arkwrights: 1758-1830.* (Manchester University Press, 1959.) Pp. 361. 35/- stg.

This book is the first work about a major unit of the early cotton factory system to appear since *Samuel Oldknow and the Arkwrights* was published in 1924. Here, especially in the contribution of Mr. A. P. Wadsworth, who died before the work was completed, is unrivalled knowledge of the early cotton textile industry, and a book worthy of the standards of scholarship set by George Unwin at Manchester and those who followed him.

GENERAL AGREEMENT ON TARIFFS AND TRADE, CONTRACTING PARTIES. *International Trade, 1957-58.* (Geneva, 1959.) Pp. 318. $2.00.

HAZLITT, HENRY. *The Failure of the "New Economics".* (D. Van Nostrand, London, 1959.) Pp. 458. 56/6 stg.

HOOD, WILLIAM C. *Financing of Economic Activity in Canada.* (Royal Commission on Canada's Economic Prospects, Ottawa, 1958.) Pp. 700. Price not stated.

JOHNSON, L. G. *The Social Evolution of Industrial Britain.* (Liverpool University Press, 1959.) Pp. 178. 25/- stg.

LEKACHMAN, R. *A History of Economic Ideas.* (Harper, New York, 1959.) Pp. 421. $5.00.

Here is the familiar story told in limpid, jargon-free English: The Beginnings; Classical Economists (including, at last, Jeremy Bentham as one of The Big Six); Marginalists and Opponents; Business Cycles, Price theory, Keynes and Capitalism. Lekachman's narrative of what the major economists actually said, supported by extensive but apt quotations, admirably complements Heimann's *History of Economic Doctrines*; the two books form an excellent and sufficient introduction to the old masters themselves.

LEWIS, J. PARRY. *An Introduction to Mathematics for Students of Economics.* (Macmillan, London, 1959.) Pp. 394. 60/- Aust.

MATHIAS, PETER. *The Brewing Industry in England, 1700-1830.* (Cambridge University Press, 1959.) Pp. 596. 85/- stg.

The introduction of porter brewing in the 1720s and the growth of urban markets provided the bases of an "industrial revolution" in the brewing industry in the eighteenth century. By skilful use of a mass of business records and secondary material, Mr. Mathias traces the changes in techniques, markets, and the structure of the industry—paying considerable attention to problems of finance and entrepreneurship—and examines their effects on British agriculture.

MAXCY, G., and SILBERSTON, A. *The Motor Industry.* (George Allen & Unwin, London, 1959.) Pp. 245. 25/- stg.

ROBBINS, LIONEL. *Robert Torrens and the Evolution of Classical Economics.* (Macmillan, London, 1958.) Pp. 367. 56/6 Aust.

ROY, RENÉ. *Production, investissements et productivité. Cahiers du Séminaire d'Économétrie No. 5.* (Centre National de la Recherche Scientifique, Paris, 1959.) Pp. 180. Price not stated.

A collection of eight studies by economists and statisticians. The subjects and authors are: (1) concept and properties of production functions (Lavaill);

(2) problems arising in measuring capital (Barna); (3) use of consumer's surplus in assessing the profitability of an investment (Lesourne); (4) use of cost functions (Schneider); (5) productivity index numbers (Marche); (6) effect of incentive schemes on productivity (Rémery); (7) methods of tariff fixing in road transport (Durand); (8) measurement of productivity in air transport (Pilé). Emphasis is on methodology, except for the last study which gives various empirical results.

SAFARIAN, A. E. *The Canadian Economy in the Great Depression.* (Canadian Studies in Economics, No. 11.) (University of Toronto Press, 1959.) Pp. 185. $3.50.

This study examines the nature of cyclical changes in Canada in the thirties, and particularly the reasons for the incomplete nature of the recovery up to 1937. The author stresses the role of developments before the thirties and of internal determinants of economic activity (especially investment) as well as external factors (on which emphasis has usually been placed). The largely aggregative analysis is supplemented by examination of the experience of a number of significant industries (wheat, newsprint, mining, utilities, automobiles and residential construction).

SASIENI, MAURICE, YASPAN, ARTHUR, and FRIEDMAN, LAWRENCE. *Operations Research.* (John Wiley, New York, 1959.) Pp. 316.

This is a clear and concise introduction to the techniques of operations research. After a brief introduction on probability and statistics, the authors treat separately such fields as inventory policy, replacement, linear programming, sequencing and dynamic programming. The book contains sets of interesting problems and, generally, should be an excellent textbook for economics students possessing a knowledge of elementary mathematics.

SHACKLE, G. L. S. *Economics for Pleasure.* (Cambridge University Press, London, 1959.) Pp. 268. 21/- stg.

SHUBIK, MARTIN. *Strategy and Market Structure.* (John Wiley, New York, 1959.) Pp. 387. $8.00.

This book is an attempt to integrate discussions about competitive behaviour with the aid of games theory. Although applications of the technique to economic analysis raise some fascinating possibilities, this book is not really convincing. The early chapters on past contributions to theories of competition and the firm are thin. The later chapters, especially on market structure, are unconvincing when it comes to arguing the merits of games theory analysis in economics.

UNITED NATIONS. *Economic Development in the Middle East, 1957-1958.* (New York, 1959.) Pp. 104. 9/- stg.

The economies of Egypt, Iran, Iraq, Jordan, Lebanon, the Sudan, Syria and Turkey form the substance of this valuable study. The subject matter is treated under the following main headings: Agriculture, industry, and mining —a separate section is devoted to petroleum—and foreign trade and payments. There is a statistical appendix which also covers transportation, finance and development expenditure.

UNITED NATIONS. (Economic Commission for Europe.) *The Economic Implications of Automation in Europe.* (Geneva, 1959.) Pp. 37 and four appendices. 3/6 stg.

The purpose of this report is to "attempt to put the development of automation in its true economic setting; to discuss the economics of automation in selected industries; and to show . . . the possibilities of further study and co-operation between countries". Material has been collected from 13 countries including the U.S.S.R. The report discusses the nature of automation and its growth and then gives some illustrations of the effects on output and cost levels following the introduction of automation in particular industries. The appendices include case studies in more detail, and there is some interesting information on the problem of determining automation efficiency in the U.S.S.R.

While there is interesting material to be gleaned from this report, the main point emerging from the discussion is that many more data are required before the wider implications of automation can be analysed.

UNITED NATIONS. (Food and Agriculture Organization.) *Food and Agricultural Price Policies in Asia and the Far East.* (United Nations, Bangkok, 1958.) Pp. 110. 9/- stg.

The study contains both a short regional review along with longer individual chapters on the food and agricultural price policies of the main countries in the region from Pakistan to Japan. The major emphasis is on policies of the post-war period, but some comparisons are made between pre-war and post-war years.

UNITED NATIONS. (Food and Agriculture Organization.) *National Grain Policies.* (Rome, 1959.) Pp. 108. Price 5/- stg.

This booklet contains factual information about the policies of twenty-one important grain-producing countries. This information is basically that used for the F.A.O. Seminar on grains in 1958, checked since by the relevant governments. Each country's policy is dealt with separately under the headings: "Measures affecting grain production and marketing", which includes policy and production objectives, marketing organizations, and price support schemes; "Measures affecting grain consumption"; and "Measures affecting foreign trade in grains".

WILKINSON, HAROLD FRANÇOIS. *Étude des Initiatives Internationales en Vue de la Stabilisation des Marchés des Produits de Base.* (E. Droz, Geneva, and Minard, Paris, 1959.) Pp. 162. S. frs. 15.

After a discussion of the consequences of the inelasticity of demand for and supply of raw materials, fluctuations of prices, volume of sales and income from export, Dr. Wilkinson outlines remedial attempts in the inter-war and post-war periods, in particular the International Wheat, Sugar and Tin Agreements. He is in favour of multilateral international agreements concerning buffer stocks rather than of control of exports.

WILLIAMS, ERNEST W. *Freight Transportation in the Soviet Union: A Comparison with the United States.* (Occasional Paper 65.) (National Bureau of Economic Research, New York, 1959.) Pp. 38. 75 cents.

This paper is a preview of a forthcoming study on transport in the Soviet Union. It analyses the various means of freight transport and the growth in aggregate freight traffic during the period 1926-1956. In each case comparison is made with the United States. The Soviet Union is shown to be very largely a railroad economy, but its rail system differs in many respects from that in the United States.

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